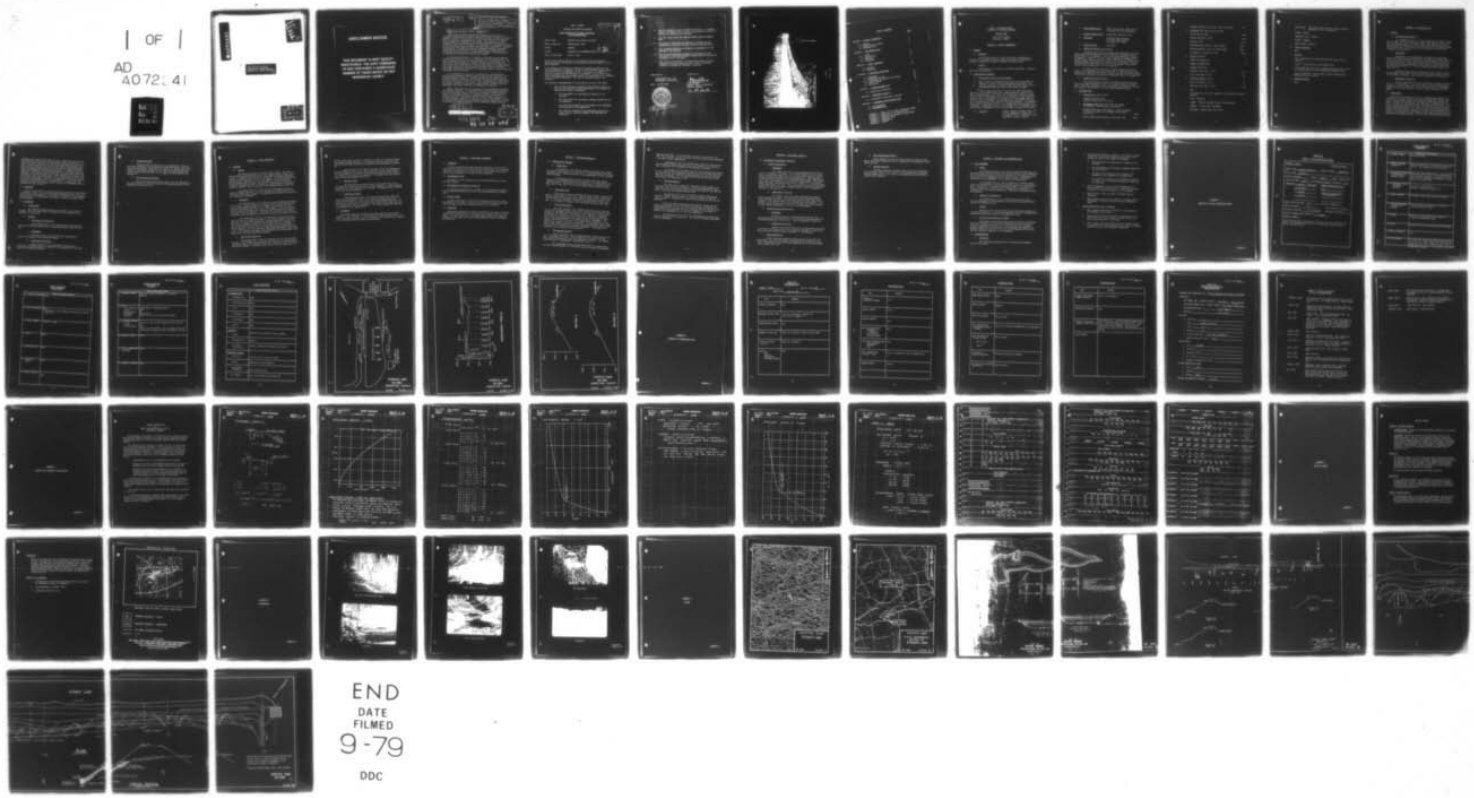
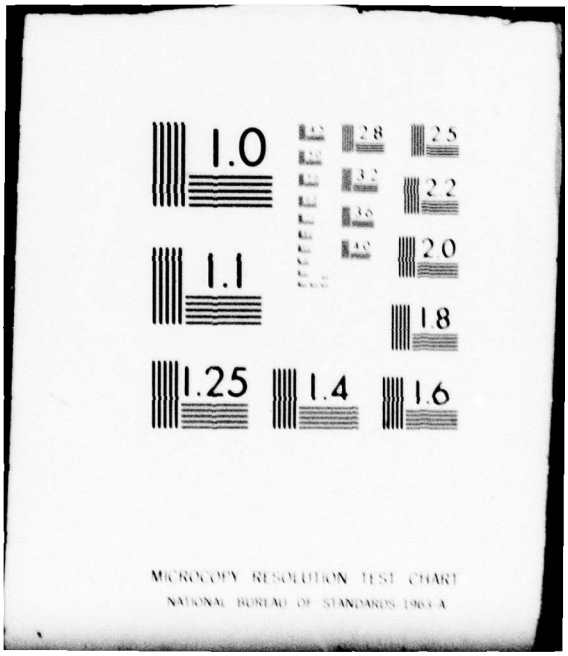
AD-A072 241 BERGER ASSOCIATES INC HARRISBURG PA F/G 13/2
NATIONAL DAM INSPECTION PROGRAM. STRACK'S DAM (NDI NUMBER PA-00--ETC(U)
MAY 79 DACW31-79-C-0012
UNCLASSIFIED NL

| OF |
AD
A072 241



END
DATE
FILMED
9-79
DDC


1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

AD A072241

LEVEL II

Distribution Unlimited
Approved for Public Release
Contract No. DACW31-79-C-0012
OK

DDC
RECEIVED
AUG 6 1979
A

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DDC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

(11) May 79

(6) National Dam Inspection Program. Strack's Dam (NDI Number PA-00596, DER Number 38-20), Delaware River Basin, Lebanon County, Pennsylvania. Phase I Inspection Report.

PREFACE

(15) DACW31-79-C-0012

This report has been prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evoluntionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

(12) 71 p.

[redacted]

DDC
RECEIVED
AUG 6 1979
A

411 003

79 08 06 062

Accession For
NTIS GRA&I
DDC TAB
Unannounced
Justification
By
Distribution/
Availability Codes
Dist | Avail and/or special
A 23

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS AND RECOMMENDATIONS

Name of Dam:	STRACK'S DAM, NDI NO. PA-00596
State & State No:	PENNSYLVANIA, 38-20
County:	LEBANON
Stream:	TRIBUTARY TO TULPEHOCKEN CREEK
Date of Inspection:	April 6, 1979

Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in poor condition.

In accordance with the Corps of Engineers' evaluation guidelines, the spillway capacity is inadequate to pass the PMF (Probable Maximum Flood) peak inflow without overtopping the dam. The project is capable of passing 27 percent of the PMF without overtopping. On the basis of the hazard classification, the spillway capacity is considered to be inadequate, but not seriously inadequate. This dam is considered unsafe, non-emergency.

The following recommendations are presented for action by the owner:

1. That detailed hydrologic, hydraulic and stability studies be made by a professional engineer experienced in the design and construction of dams to determine:

   a. The requirements for improving the capacity of the spillway.

   b. The requirements for providing a drawdown capability for the reservoir.

   c. The source and condition of the seepage on the embankment using appropriate instrumentation.

   d. The stability condition of the embankment slope and if found critical, determine measures for improving the condition.

2. That the embankment crest be raised immediately to a uniform height of elevation 523.2 (.5 feet above present low point) to improve the capacity of the spillway.

3. That all trees, brush and weeds be removed from the embankment.

4. That adequate protection be installed to prevent further undermining of spillway slab and erosion of spillway chute.

5. That a regular maintenance procedure be established for the embankment and spillway.

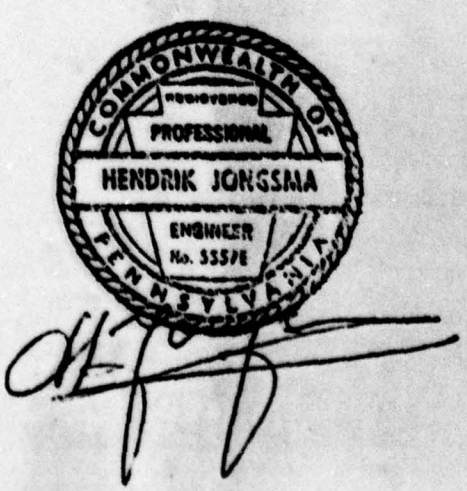
6. That a regular inspection program be established for the facilities, which should include a weekly visit to the site by representatives of the owner.

7. That a formal surveillance and downstream warning system be developed to be used during periods of high or prolonged rainfall or during other emergency conditions.

SUBMITTED BY:

BERGER ASSOCIATES, INC.
HARRISBURG, PENNSYLVANIA

DATE: May 29, 1979



APPROVED BY:

G. K. WITHERS
Colonel, Corps of Engineers
District Engineer

DATE 27 Jun 79

OVERVIEW

STRACK'S DAM

TABLE OF CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

STRACK'S DAM

NDI-ID NO. PA-00596
DER-ID NO. 38-20

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

A. Authority

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspections of dams throughout the United States.

B. Purpose

The purpose is to determine if the dam constitutes a hazard to human life and property.

1.2 DESCRIPTION OF PROJECT

A. Description of Dam and Appurtenances

ABSTRACT

Note: The only available general plan of the dam (Plate IV, Appendix F), used a spillway elevation 100 as datum. The spillway elevation on available HUD Flood Study Maps is 517.7. This elevation has been used in this report as datum.

Strack's Dam, identified on the U.S.G.S. map as Myerstown Reservoir, is an earthfill dam with a maximum height of about 25 feet above original ground. The length of the earthfill structure is about 500 feet and the low point in the crest of the dam is 5 feet above the spillway crest. The spillway is located in the left abutment and has been cut into the hillside. The foundation of a pump house is located at the downstream toe of the dam near the right abutment. The inspection team could not determine if there is a drawdown pipe located under the embankment. Clearing of debris in the foundation of the pumphouse would be required to determine if there are any valves or gates in the area.

ABSTRACT

B. Location:

Jackson Township, Lebanon County, PA
U.S.G.S. Quadrangle, Bethel, PA
Latitude 40°-23.1', Longitude 76°-20.5'
(Appendix F, Plates I and II)

C. Size Classification: Small (25 feet high, 480 acre-feet at present low crest elevation)

D. Hazard Classification: Significant (Section 3.1.E)

E. Ownership: Myerstown Water Authority
515 South College Street
Myerstown, Pa. 17067

F. Purpose of Dam: Recreation

G. Design and Construction History

A drawing in the files of Pennsylvania Department of Environmental Resources (PennDER) dated 1895 (Plate III, Appendix F) has a general plan of the reservoir. The actual construction date, however, is unknown. A report by the Water Supply Commission, predecessor of PennDER, dated February 20, 1919, states that the date of construction, design engineer, and construction methods were all unknown. The dam could have been constructed by the Union Canal Company, which would indicate that the dam is at least 150 years old.

In 1933, an effort was made to reduce leakage by drilling holes in the embankment at leakage points and to fill these holes with tamped clay. Only three holes were drilled. In 1938, a lateral drainage system was installed in the downstream embankment (Plate V, Appendix F).

H. Normal Operating Procedures

The dam is presently owned by the Myerstown Water Authority, but has not been considered or used as a standby reservoir for many years. Operating procedures do not exist and the reservoir is used only for fishing. The spillway is the only known discharge outlet.

1.3 PERTINENT DATA

A. Drainage Area (square miles)

Computed for this report (Original design used 1.2 sq.mi.)	1.5

B. Discharge at Dam Site (cubic feet per second)
See Appendix C for hydraulic calculations.

Maximum known flood, 1972 (Agnes). Inflow estimated on basis of records for USGS gage on Beck Creek near Cleona	1,370
Outlet works low-pool outlet at pool Elev. 515	None

	Spillway capacity at pool Elv. 522.7 (low point)	510
C.	Elevation (feet above mean sea level)	
	Top of dam (in 1919)	523.7
	Present low point of dam	522.7
	Spillway crest	517.7
	Upstream portal invert of outlet tunnel	None
	Downstream portal invert of outlet tunnel	None
	Streambed at centerline of dam	498±
D.	Reservoir (miles)	
	Length of maximum pool	.6
	Length of normal pool	.4
E.	Storage (acre-feet)	
	Spillway crest (Elev. 517.7)	262
	Top of dam (Elev. 522.7)	480
F.	Reservoir Surface (acres)	
	Top of dam (Elev. 522.7)	58
	Spillway crest (Elev. 517.7)	30

G. Dam

See Plates III, IV and V, Appendix F, for available plan and sections.

Type: Earthfill.

Length: 500 feet embankment and 16 feet spillway.

Height: 25 feet above streambed.

Top Width: Varies from 8 to 11 feet

Side Slopes: Upstream 1.6H to 1V (survey, above flowline)
Downstream 1.7H to 1V (survey)

Zoning: Unknown

Impervious Core: Unknown

Cutoff: Unknown

Grout Curtain: Unknown

H. Outlet Facilities

None

I. Spillway

Type: Uncontrolled broadcrested weir with chute in left abutment.

Length: 16 feet between stone masonry wall.

Crest Elevation: Weir crest is dipped with low point of 517.7 at center and about 3-inches higher near abutment walls.

Chute: Paved over 35 feet length, without training walls. Beyond this point, unlined.

J. Regulating Outlet

None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

A. Hydrology and Hydraulics

The PennDER files did not contain hydrologic or hydraulic data for this dam. The first inspection report, dated February 1919, states that the drainage area was 1.2 square miles, that the surface area of the reservoir at spillway crest was 30 acres and that the storage volume was 262 acre-feet. The spillway capacity was given as 700 cfs and considered to be adequate.

B. Embankment

Design data for the embankment are apparently nonexistant. The material used for the embankment was described in the 1919 report as clayey shale and some rocks. The slopes of the embankment were unprotected at that time. The downstream slope was 2H to 1V, the crest had an irregular width and the upstream slope above the normal pool level was very steep (1.3H to 1V). The slope below the normal waterline was about 2H to 1V.

Inspection reports by PennDER indicate that seepage through the embankment increased through the years and caused a serious concern for the safety of the dam. See Appendix B, page B-6 and Section 2.2.

C. Appurtenant Structures

The data search did not find any drawings or design information relative to the spillway or the outlet works. A drawing, dated 1900, indicates a 48-inch intake pipe from the upstream toe to the pumphouse. Evidence of this pipe could not be found on other drawings or in the field.

2.2 CONSTRUCTION

There is no information in the files concerning the original construction of the dam. Inspection reports by PennDER from 1919 to 1938 indicate that seepage through the embankment became worse through the years. In 1919, it was reported that large trees, estimated to be at least 30 years old, covered both slopes and the crest of the dam. Trees on the upstream slope were cut in 1921. In 1929 the trees on the downstream slope were removed. The saturation line on the downstream slope varied in the reports from halfway up to within 8 feet from the top. In general, the saturation was the highest on the right side over 100 feet, from where it gradually dropped. The left end of the embankment had the

saturation line about 6 feet above the toe. Riprap was placed on the upstream slope in 1933 as protection against wave action and 2 or 3 holes were drilled near the left end of the embankment and filled with clay. A letter states that no other holes were drilled because the drilled holes indicated that there was no leakage through the embankment, but seepage came through the foundation. In 1938 the old tree stumps were removed on the downstream slope and a drainage system was installed. The drainage system consisted of placing 4-inch vitrified drainage tile laid in crushed rock. These laterals were placed at 20-foot centers (See Plate V, Appendix F), and intercepted at the toe by a 6-inch pipe drain along the toe of the embankment. This drain terminates below the pumphouse and in the spillway. It appears that this drainage system is not working properly because the embankment still is saturated at many locations.

2.3 OPERATION

Since at least 1895, the reservoir has been operated for the Borough of Myerstown. First by the Myerstown Water Company and since 1959, by the Myerstown Water Authority. At present the reservoir is on a standby supply basis but is mostly used for fishing. Records of operation are not maintained.

2.4 EVALUATION

A. Availability

The available engineering data is contained in the files of PennDER. The owner stated that no drawings or other information was available in his office.

B. Adequacy

1. Hydrology and Hydraulics

The available data is not considered to be sufficient to review the hydrologic and hydraulic engineering analysis made for this dam.

2. Embankment

The files did not contain sufficient information to review the adequacy of the embankment design.

3. Appurtenant Structures

Detail drawings of the appurtenant structures are apparently nonexistant and it is unknown if the foundation of the spillway can be considered adequate.

C. Operating Records

Formal records of operation are not maintained. The only available information was obtained from inspection reports written by State representatives. Based on these reports, it appears that maintenance of the facilities was poor and that seepage conditions were serious between 1919 and 1938. For a summary of these reports, see Appendix B.

D. Post Construction Changes

The only reported modification made to the dam consisted of the installation of a drainage system in the downstream slope of the embankment (see Section 2.2).

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of Strack's Dam is poor. The downstream slope is saturated over most of its height and has a heavy growth of trees. Drawdown facilities do not exist and the spillway discharge channel is unprotected over most of its length. The dam is owned by the Myerstown Water Authority, but the land adjacent to the reservoir is owned privately and at present the reservoir is used for recreation. A telephone conversation with Mr. Hilgartner, Superintendent of the Water Authority indicates that the Authority very seldom visits the dam site.

The visual inspection check list is in Appendix A of this report, including sketches of survey information of the profile of the dam breast and typical sections. Photographs taken during the inspection are reproduced in Appendix E.

B. Embankment

The upstream slope of the dam was in fair condition and appears to be stable. Several gullys were evident at the top and several trees on the slope should be removed. Old stumps of previously cut trees indicate that many large trees were on this slope. The top of the dam has some light brush and a dirt footpath, indicating that the breast is extensively used by fishermen. The profile of the crest was surveyed (see Plate A-II, Appendix A) and appears to be below the design elevation.

The downstream slope has a dense growth of brush and trees, with trees up to 18 inches in diameter. The brush prevents close observation of the slope and sloughage or slippage areas were not noticed. The slope is, however, saturated and soft over most of its height. At the toe and downstream of the toe, the ground is totally saturated, marshy and soft. The soft condition of the slope has caused some trees to be uprooted and it is feared that additional uprooting of trees could occur. The subsurface drainage system installed on the downstream slope and in the toe is not functioning properly.

C. Appurtenant Structures

The broadcrested, uncontrolled spillway is cut into the left abutment. The forebay area is shallow and there are no training walls. Two short masonry stone abutment walls are located at the weir, which is paved with concrete. The paved chute is about 35 feet long, with a 13

percent slope, where it drops vertically 2.5 feet to an unlined channel with easily erodable material. Considerable erosion has occurred and the end of the chute is partially undermined (see photographs, Appendix E).

The reservoir has no intake structure. Only the foundation of an old pumphouse is left at the downstream toe near the right abutment. The rusty remains of an unidentified mechanism, possibly a gear valve, is located in the ruins of the pumphouse. It appears that the reservoir does not have any drawdown facilities.

D. Reservoir Area

The banks of the reservoir appear to be stable, the lake is surrounded by cultivated land and some light woodland. A small reservoir located on the north bank has been breached. Information about siltation in the lake was not available.

E. Downstream Channel

The downstream channel is the natural stream with some woodlands and some farmland. There are no houses located close to the stream over the first 1.2 miles until the stream reaches Route 422. The flood plain is wide and it is expected that loss of life could occur if the dam would fail due to overtopping. The hazard category for this dam is considered to be "Significant".

3.2 EVALUATION

The Strack's Dam and its appurtenant works appear to be in poor condition. The saturation of the downstream slope and along its toe are points of serious concern. The heavy growth on the slope and the condition of the spillway calls for immediate maintenance.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURE

The dam is owned by the Myerstown Water Authority, but the facilities have not been used in their system for many years. In its present condition it could not be used due to lack of pipes and valve control. There are no procedures for operating these facilities.

4.2 MAINTENANCE OF DAM

Maintenance on the embankment has not been performed in at least the last 10 years.

4.3 MAINTENANCE OF OPERATING FACILITIES

The operating facilities are limited to the uncontrolled spillway and an abandoned pumphouse which have not been maintained for several years.

4.4 WARNING SYSTEM

A formal surveillance and downstream warning system has not been established by the owners. During recent years, very few if any visits have been made to the dam by representatives of the Authority.

4.5 EVALUATION

Operational procedures for these facilities do not exist at present. A maintenance schedule for the embankment and spillway should be established. A formal surveillance and downstream warning system should be developed by the owner to be used during periods of high or prolonged precipitation.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

The hydrologic and hydraulic analyses available from PennDER for Strack's Dam were not very extensive. No stage-storage curve, stage discharge curve, design storm data, flood hydrographs or flood routings were available.

A seven-page report prepared in 1919 by the Water Supply Commission of Pennsylvania listed the capacity of the reservoir as 85.4 million gallons. This report also indicated that the spillway was 17 feet long, 6 feet below the top of the dam and had a capacity of 700 cfs.

B. Experience Data

There were no records available for past floods. Calculations based on the records of the U.S.G.S. gaging station on Beck Creek, near Cleona, indicate that the greatest flood, in recent years, occurred on June 22, 1972, and produced an inflow to the reservoir of about 1,370 cfs. It is unknown if damage to the facilities occurred on that date.

C. Visual Observations

The files available from PennDER contained a plan of the dam and reservoir, dated October, 1909, which showed a 48-inch blowoff pipe through the embankment and discharging at the pumphouse. During this inspection, the existence of the blowoff pipe could not be verified. The remains of a 20-inch pipe were found in the ruins of the old pumphouse. This pipe appeared to be coming through the embankment. No control was found for this pipe or any other pipes; therefore, if any blowoff pipe exists, it would be inoperable. An inspection report dated March, 1929, indicated that the blowoff had upstream control and at that time the control platform was partially collapsed. The platform was nonexistent at the time of this inspection.

D. Overtopping Potential

Strack's Dam has a total storage capacity of 480 acre-feet and an overall height of 25 feet, both referenced to the top of the dam. These dimensions indicate a size classification of "Small". The hazard classification is "Significant" (see Section 3.1.E).

The recommended Spillway Design Flood (SDF) for a dam having the above classifications is the 100-year flood to one-half the Probable

Maximum Flood (PMF). The recommended capacity for this dam is 1/2 PMF. For this dam, the PMF peak inflow is about 3,480 cfs (see Appendix C for HEC-1 inflow computations).

Comparison of the estimated PMF peak inflow of 3,480 cfs with the estimated spillway discharge capacity of about 510 cfs indicates that a potential for overtopping of the Strack's Dam exists.

An estimate of the storage effect of the reservoir and routing of the computed inflow hydrograph through the reservoir shows that this dam does not have the necessary storage available to pass the one-half PMF with overtopping. The spillway-reservoir system can pass a flood event equal to 27 percent of a PMF.

E. Spillway Adequacy

The small size category and significant hazard category, in accordance with the Corps of Engineers criteria and guidelines, indicates that the spillway design flood for this dam should be the 100-year flood to one-half the Probable Maximum Flood.

Calculations show that the spillway discharge capacity and reservoir storage capacity combine to handle 27 percent of the PMF (Refer to Sheet 7 of Appendix C), based on the present low point in the embankment.

Since the spillway discharge and reservoir storage capacity cannot pass one-half of the PMF without overtopping, and because the downstream hazard to loss of life is significant and this hazard is not significantly increased when the dam is overtopped, the spillway is judged to be inadequate but not seriously inadequate.

The hydrologic analysis for this investigation was based upon existing conditions of the watershed. The effects of future development were not considered.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

A. Visual Observations

1. Embankment

The visual inspection of the embankment did not detect signs of sloughage or slippage. The saturated condition of the slope and toe and the many large trees on the slope could, however, cause a serious unstable condition of the downstream slope. This condition is of serious concern and should be thoroughly investigated. The upstream slope, above the waterline, was surveyed as being 1.6H to 1V and the downstream slope varied from 1.7H to 1V to 2.1H to 1V. The crest width varied from 8 feet to 11 feet. The crest profile is below the elevation reported in 1919 (6 feet above spillway crest). Refer to Appendix A, Plates A-I, A-II and A-III.

2. Appurtenant Structures

The spillway weir was in fair condition and slightly dipped towards the center. The approach has no training walls and a large discharge over the weir could cause erosion to the right of the spillway. The abutment walls of the spillway are short and low. The spillway chute is paved over 35 feet of its length and further erosion of this channel, downstream of the weir, can be expected.

B. Design and Construction Data

1. Embankment

Records of design or construction data do not exist. A drawing detailing the installation of the subsurface drainage system on the downstream slope is in the file. Refer to Appendix F, Plate IV.

2. Appurtenant Structures

Design or construction data for the appurtenant structures are limited to a general plan of the reservoir (Appendix F, Plate III), which shows the original piping arrangement in the pumphouse.

C. Operating Records

Formal operating records for these facilities have not been maintained. The files of PennDER contain reports on inspection since 1919, indicating that saturation and seepage has been a serious problem since at least that year.

D. Post Construction Changes

Files indicate that the only major change occurred in 1938, when a subsurface drainage system was installed on the downstream slope and at the toe.

E. Seismic Stability

This dam is located in Seismic Zone 1 and it is considered that the static stability is sufficient to withstand minor earthquake induced dynamic forces. No studies or calculations have been made to confirm this assumption.

SECTION 7 - ASSESSMENT AND RECOMMENDATIONS

7.1 DAM ASSESSMENT

A. Safety

The visual inspection, the review of available design data and the operational history indicates that Strack's Dam is in poor condition. The heavy growth on and the saturated condition of the downstream slope and the toe of the embankment are of serious concern. Maintenance procedures for the embankment and facilities are nonexisting.

In accordance with the Corps of Engineers' evaluation guidelines, the combination of storage and spillway capacity is sufficient to pass 27 percent of the Probable Maximum Flood (PMF). The hazard category is significant. The spillway is, therefore, considered to be inadequate but not seriously inadequate. This dam is considered unsafe, non-emergency.

B. Adequacy of Information

The available data is not considered sufficient to make a detailed assessment of the embankment or to assess the saturated condition of the downstream slope.

C. Urgency

Because of the serious concern for the saturated condition of the downstream slope, it is considered important that the recommendations presented in this report should be implemented at once.

D. Necessity for Additional Studies

The results of this inspection indicate the need for detailed hydrologic, hydraulic and stability studies to determine the requirements for improving the capacity of the spillway and for providing drawdown capability of the reservoir, to investigate and evaluate the seepage conditions on and below the toe of the embankment and to determine the stability condition of the embankment.

7.2 RECOMMENDATIONS

A. Facilities

The following recommendations are presented for immediate action by the owner:

1. That detailed hydrologic, hydraulic and stability studies be made by a professional engineer experienced in the design and construction of dams to determine:

   a. The requirements for improving the capacity of the spillway.

   b. The requirements for providing a drawdown capability for the reservoir.

   c. The source and condition of the seepage on the embankment using appropriate instrumentation.

   d. The stability condition of the embankment slope and if found critical, determine measures for improving the condition.

2. That the embankment crest be raised immediately to a uniform height of elevation 523.2 (.5 feet above present low point) to improve the capacity of the spillway.

3. That all trees, brush and weeds be removed from the embankment.

4. That adequate protection be installed to prevent further undermining of spillway slab and erosion of spillway chute.

B. Operation and Maintenance Procedures

1. That a regular maintenance procedure be established for the embankment and spillway.

2. That a regular inspection program be established for the facilities, which should include a weekly visit to the site by representatives of the owner.

3. That a formal surveillance and downstream warning system be developed to be used during periods of high or prolonged rainfall or during other emergency conditions.

APPENDIX A

CHECKLIST OF VISUAL INSPECTION REPORT

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 38-20 NDI NO. PA-00 596

NAME OF DAM Strack's Lake Dam HAZARD CATEGORY Significant

TYPE OF DAM Earthfill

LOCATION Jackson TOWNSHIP Lebanon COUNTY, PENNSYLVANIA

INSPECTION DATE 4/6/79 WEATHER Sunny - Windy TEMPERATURE 40's

INSPECTORS:	OWNER'S REPRESENTATIVE(s):
R. Houseal (Recorder)	
R. Shireman	None
H. Jongsma	Called Mr. Hillgartner - no information
A. Bartlett	

NORMAL POOL ELEVATION: 517.7 AT TIME OF INSPECTION:

BREAST ELEVATION: 522.7 POOL ELEVATION: 517.8

SPILLWAY ELEVATION: 517.7 (HUD Map) TAILWATER ELEVATION:

MAXIMUM RECORDED POOL ELEVATION: No records

GENERAL COMMENTS:

The downstream slope is overgrown with large trees and saturated with water. The spillway chute is short and unprotected beyond a point 35 feet beyond the weir.

NDI NO. PA-00 596

VISUAL INSPECTION
EMBANKMENT

	OBSERVATIONS AND REMARKS
A. SURFACE CRACKS	None detectable.
B. UNUSUAL MOVEMENT BEYOND TOE	None detectable due to wooded area (brush and trees). Area beyond toe is soft and wet.
C. SLOUGHING OR EROSION OF EMBANKMENT OR ABUTMENT SLOPES	Downstream slope covered with brush and trees. Slope seepage extensive. Slope surface uneven but could not identify any sloughing. Several gullys at upstream side.
D. ALIGNMENT OF CREST: HORIZONTAL: VERTICAL:	Horizontal alignment good. Vertical - See profile Plate A-II.
E. RIPRAP FAILURES	No riprap, except some stone at waterline.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	Sound junctures with spillway on left and natural ground on right.
G. SEEPAGE	Extensive seepage along entire length of downstream embankment slope.
H. DRAINS	Subsurface drains outletting near old pumphouse.
J. GAGES & RECORDER	None.
K. COVER (GROWTH)	Upstream slope short weed growth, several trees 6" to 10" dia. Other larger trees have been cut; stumps still in slope. Downstream slope heavy brush, many trees 14" to 18" on slope. Top: light brush and dirt path.

NDI NO. PA-00 596

VISUAL INSPECTION
OUTLET WORKS

	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	None.
B. OUTLET STRUCTURE	None. Old pumphouse, only foundation left and one rusted gear valve.
C. OUTLET CHANNEL	Channel to creek.
D. GATES	None.
E. EMERGENCY GATE	None.
F. OPERATION & CONTROL	None.
G. BRIDGE (ACCESS)	None.

NDI NO. PA-00 596

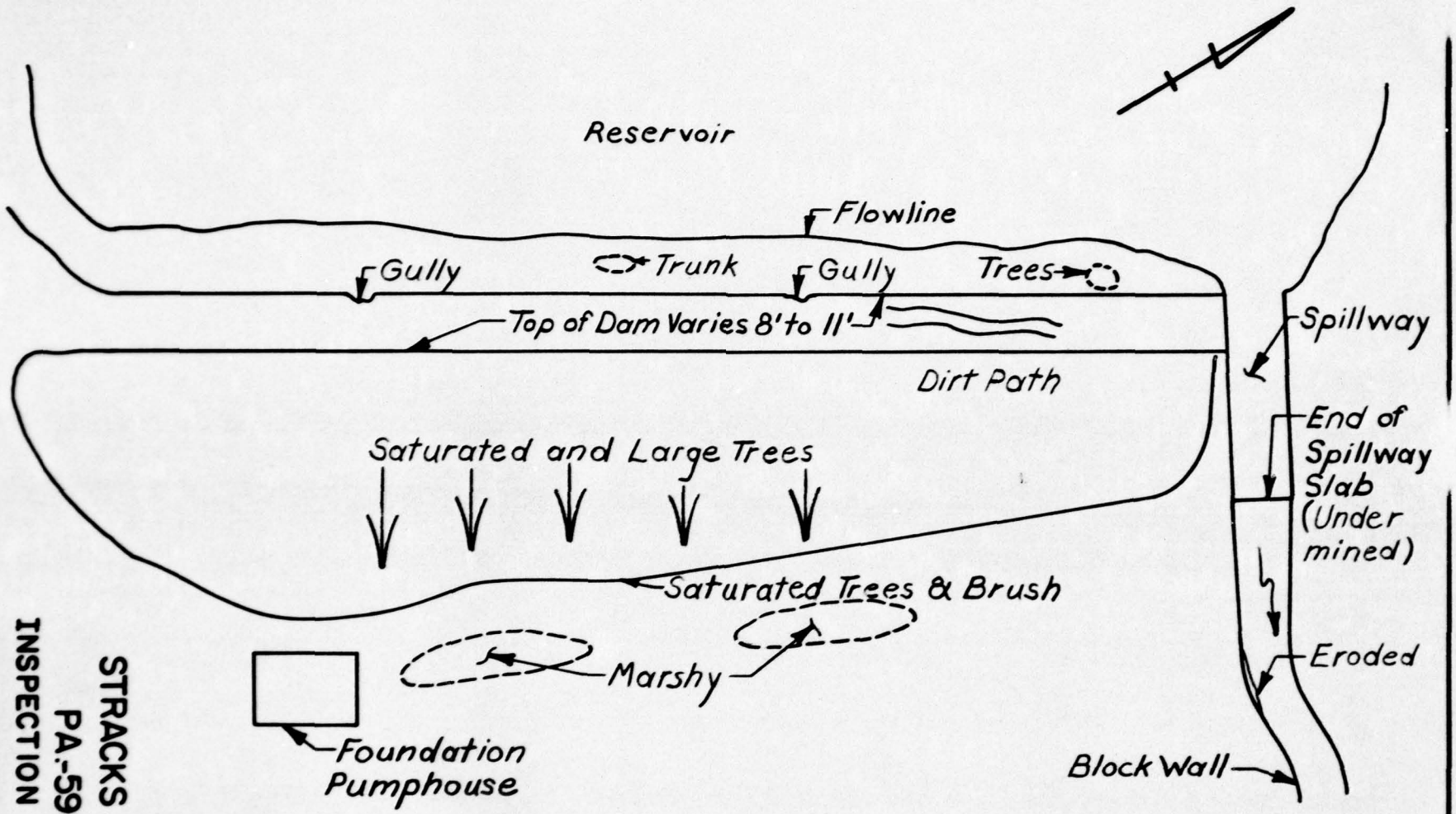
VISUAL INSPECTION
SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Directly from the reservoir - no channel. Shallow.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	 Broadcrested, uncontrolled weir. None. No. Not visible. Small and short walls in good condition.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	 First part over 35 feet concrete slab, no walls. No. None. End of slab undermined. Rest of channel excavated in hillside, unprotected and considerable erosion.
D. BRIDGE & PIERS	None.
E. GATES & OPERATION EQUIPMENT	None.
F. CONTROL & HISTORY	None.

NDI NO. PA-00 596

VISUAL INSPECTION

	OBSERVATIONS AND REMARKS
INSTRUMENTATION Monumentation	None.
Observation Wells	None.
Weirs	None.
Piezometers	None.
Staff Gauge	None.
Other	None
RESERVOIR Slopes	Cultivated land and some light woodland.
Sedimentation	Unknown.
Watershed Description	Rolling farmland and village of Kutztown.
DOWNSTREAM CHANNEL Condition	Natural stream, some steep drops.
Slopes	Woodland and some farmland.
Approximate Population	None till Route 422.
No. Homes	None in flood plain till Route 422.

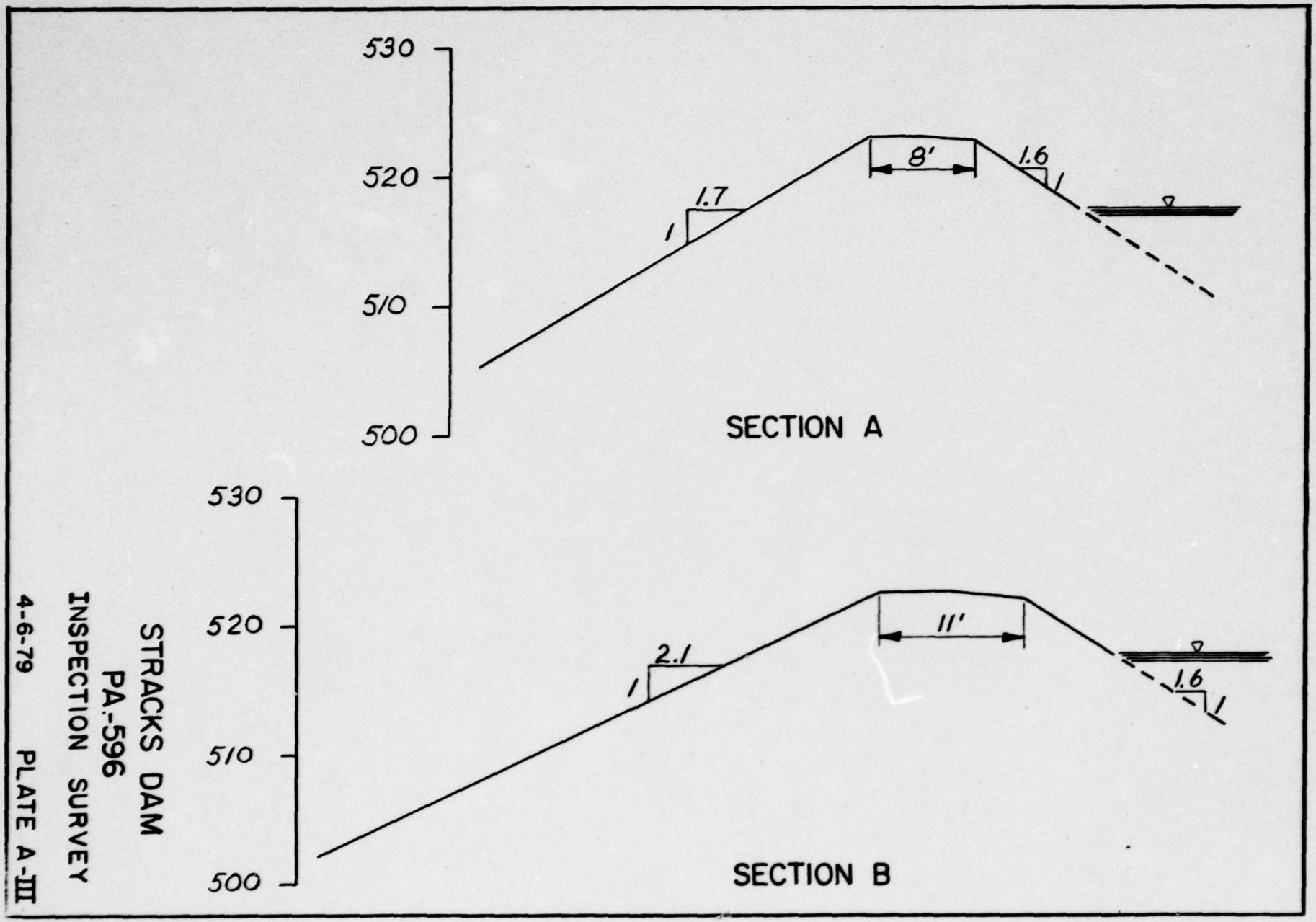


STRACKS DAM
PA-596
INSPECTION SURVEY
4-6-79 PLATE A-I

EMBANKMENT PROFILE

STRACKS DAM
PA.-596
INSPECTION SURVEY

4-6-79 PLATE A-II



STRACKS DAM
PA.-596
INSPECTION SURVEY
4-6-79 PLATE A-III

APPENDIX B

CHECKLIST OF ENGINEERING DATA

CHECK LIST
ENGINEERING DATA

PA DER # 38-20 NDI NO. PA-00 596

NAME OF DAM Strack's Dam

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle - Bethel, Pa. See Plate II, Appendix F
CONSTRUCTION HISTORY	None.
GENERAL PLAN OF DAM	Plate IV, Appendix F (dated October 1933).
TYPICAL SECTIONS OF DAM	Plate IV, Appendix F.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	None.

NDI NO. PA-00 596

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	None.
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	None.
POST CONSTRUCTION SURVEYS OF DAM	Plate IV, Appendix F and in PennDER files.
BORROW SOURCES	Unknown.

NDI NO. PA-00 596

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Unknown.
HIGH POOL RECORDS	Not recorded.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	Inspection Report by PennDER and its predecessor.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None recorded.
MAINTENANCE & OPERATION RECORDS	Inspection Reports by PennDER.
SPILLWAY PLAN, SECTIONS AND DETAILS	None available.

NDI NO. PA-00 596

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	Plate III, Appendix F.
CONSTRUCTION RECORDS	None.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	In PennDER files. Serious leakage problems since 1919. Drainage system installed in 1938. Downstream slope was saturated. 30 year old trees reported in 1919 on upstream and downstream slopes and on crest of dam. Spillway deteriorated in 1924.
MISCELLANEOUS	

NDI NO. PA-00596

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Rolling farmland and village of Kutztown.

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev.517.7 262 Acre-Feet

TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev.522.7 480 Acre-Feet

MAXIMUM DESIGN POOL: Elev. Unknown

TOP DAM: Elev. 522.7

SPILLWAY:

a. Elevation 517.7

b. Type Broadcrested weir

c. Width 16

d. Length 35

e. Location Spillover Left end of embankment.

f. Number and Type of Gates None.

OUTLET WORKS:

a. Type Unknown

b. Location

c. Entrance inverts

d. Exit inverts

e. Emergency drawdown facilities

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location

c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: 510 cfs

SUMMARY OF INSPECTION REPORTS BY STATE REPRESENTATIVES

February, 1919:	Both slopes and crest covered with trees (at least 30 years old). No seepage detected. Swampy beyond toe.
April, 1921:	Trees cut on upstream slope. Two small leaks on downstream slope at right end at pool level. Downstream slope soggy.
May, 1924:	Uneven crest. Badly eroded upstream slope. Toe swampy. Trees on downstream slope.
May, 1927:	Same condition. Seepage at 60 feet from right end to the left of the pumphouse. Slope saturated to within 8 feet from top. Saturation line drops gradually to toe at left end. It appears leakage more serious than in 1919. Chance of failure mentioned.
August, 1928:	Same condition.
March, 1929:	Trees cut on downstream slope. More leakage than previous, to within 4 feet from pool level.
June, 1931:	Embankment saturated over full length. Seepage at right end is in the form of two small streams at 6 feet above the toe. Unsafe condition.
April, 1932:	Leakage getting worse. Also leakage at blowoff pipe.
June, 1934:	Same condition.
April, 1935:	Saturation halfway up at right end, continuous over 100 feet and then gradually drops to 6 feet above toe.
January, 1939:	Embankment cleared, drainage system completed. Downstream slope appears to be saturated.
May, 1940:	Water coming from two places near left end, two places near center and one place at right end. Water appearing 6 to 8 feet above toe. Seepage along full toe length. Beyond toe swampy.

March, 1942:	Flow from drainpipe equivalent to 1.5-inch pipe. Toe appears not as wet. Spillway abutments in poor condition.
March, 1946:	Brush on slope. Water seepage on lower 10 feet (saturated). Capacity of spillway considered to be less than 50 percent of required capacity.
March, 1959:	Brush and trees. Some leakage.
October, 1970:	Some seepage. Brush and trees.

APPENDIX C

HYDROLOGY AND HYDRAULIC CALCULATIONS

SUMMARY DESCRIPTION
OF
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION

The hydrologic and hydraulic evaluation for this inspection report has employed computer techniques using the Corps of Engineers computer program identified as the Flood Hydrograph Package (HEC-1) Dam Safety Version.

The program has been designed to enable the user to perform two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam, and (2) the capability to estimate the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. A brief summary of the computation procedures typically used in the dam overtopping analysis is shown below.

- Development of an inflow hydrograph to the reservoir.
- Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.
- Routing of the outflow hydrograph(s) of the reservoir to desired downstream locations. The results provide the peak discharge, time of the peak discharge and maximum stage of each routed hydrograph at the outlet of the reach.

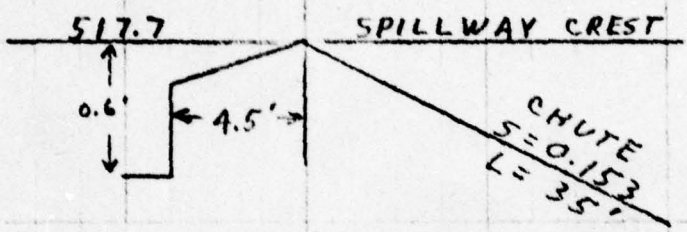
The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

The results of the studies conducted for this report are presented in Section 5.

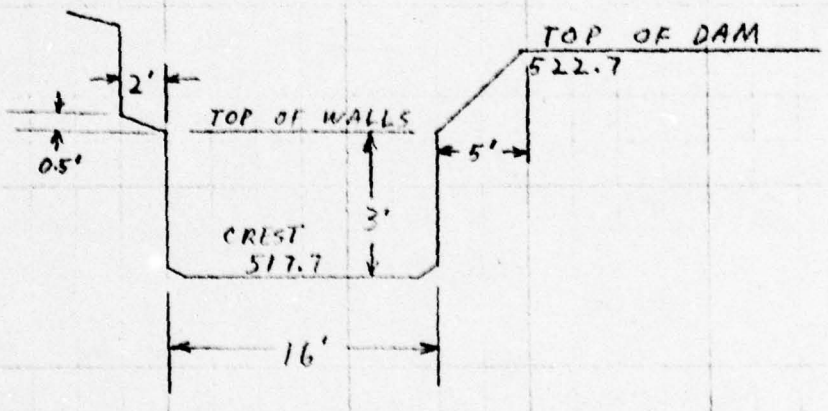
For detailed information regarding this program refer to the Users Manual for the Flood Hydrograph Package (HEC-1) Dam Safety Version prepared by the Hydrologic Engineering Center, U. S. Army Corps of Engineers, Davis, California.

BY RLS DATE 4/18/79 | BERGER ASSOCIATES | SHEET NO. 1 OF
CHKD. BY ____ DATE ____ | PROJECT D8990
SUBJECT STRACK'S DAM

SPILLWAY CAPACITY



C = 2.7 (ESTIMATED FROM KING'S HDBK)



C = 2.7
L = 16'
H = 5.0'

SLOPED PORTIONS
L_1 = 2' L_2 = 5'
AVG. H_1 = 1.75' AVG. H_2 = 1.0'

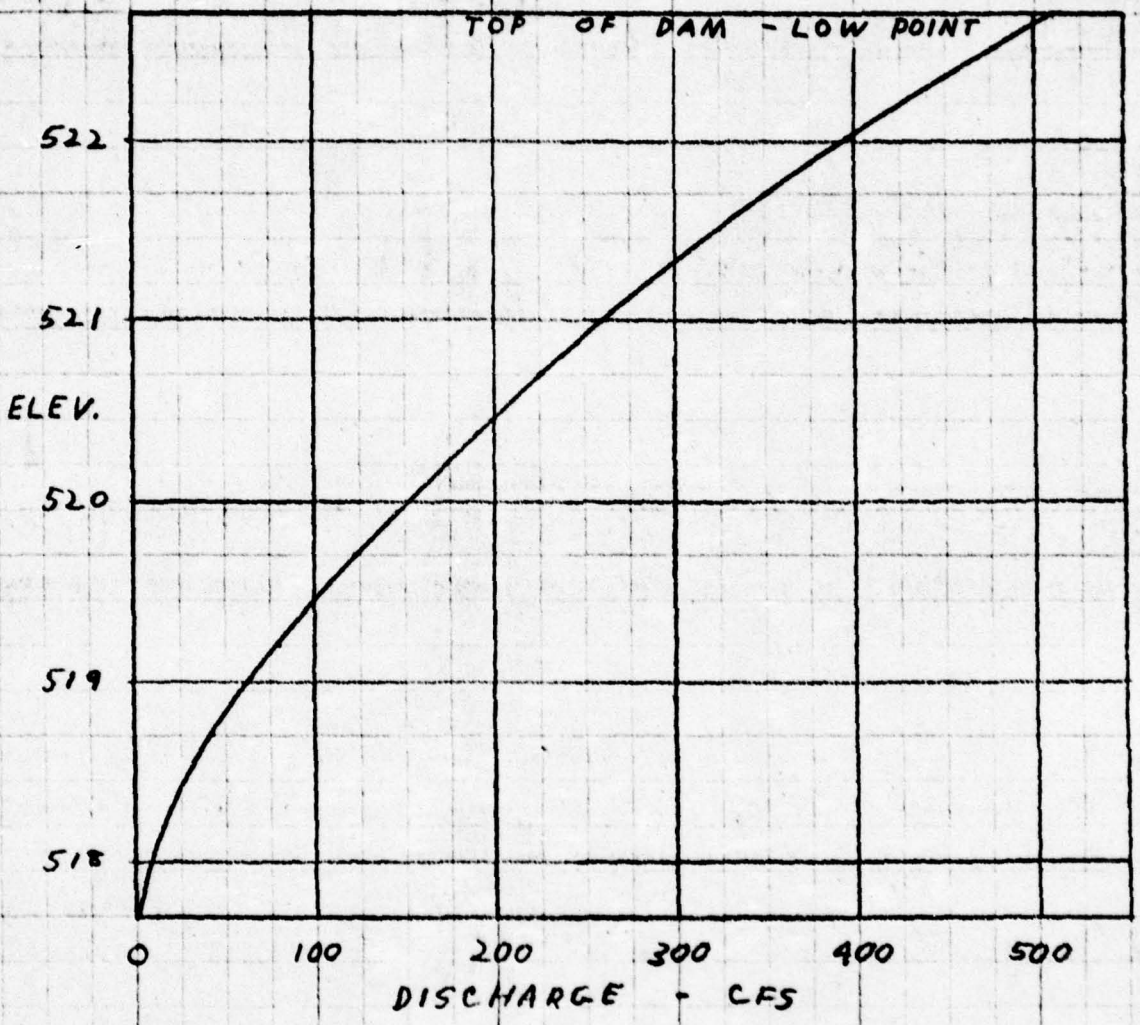
$$Q = CLH^{3/2} + CL_1H_1^{3/2} + CL_2H_2^{3/2}$$

$$= (2.7 \times 16 \times 5^{3/2}) + (2.7 \times 2 \times 1.75^{3/2}) + (2.7 \times 5 \times 1^{3/2})$$

= 509 CFS SAY 510 CFS

BY KLS DATE 4/18/79 | BERGER ASSOCIATES | SHEET NO. 2 OF
CHKD. BY DATE | PROJECT R-8490
SUBJECT STRACK'S DAM

SPILLWAY RATING CURVE



MAXIMUM KNOWN FLOOD AT DAM SITE

NO INFORMATION AVAILABLE ON WATER LEVEL IN RESERVOIR. MAXIMUM INFLOW ESTIMATED BASED ON NEARBY BECK CREEK GAGING STATION, NEAR CLEONA. FOR THE PERIOD OF RECORD FROM 1963 TO 1978 THE MAXIMUM DISCHARGE AT THE GAGE WAS 5150 CFS ON JUNE 22, 1972. DRAINAGE AREA IS 7.87 SQ. MI.

MAXIMUM INFLOW TO STRACKS DAM =

$$\left(\frac{1.5}{7.87}\right)^{.8} \times 5150 = 1367 \quad \text{SAY} \quad 1370 \text{ CFS}$$

BY RLS DATE 9/18/79 | BERGER ASSOCIATES | SHEET NO. 3 OF
CHKD. BY DATE | PROJECT D8490
SUBJECT STRACK'S DAM

EMBANKMENT RATING

ELEV. 522.8

$2.7 \times 50 \times .1^{3/2} = 4$ CFS

ELEV. 522.9

$2.7 \times 50 \times .2^{3/2} = 12$
$2.7 \times 50 \times .1^{3/2} = 4$
$2.7 \times 95 \times .05^{3/2} = 3$
$2.7 \times 11 \times .1^{3/2} = 1$ $\Sigma = 20$ CFS

ELEV. 523.0

$2.7 \times 50 \times .3^{3/2} = 22$
$2.7 \times 50 \times .2^{3/2} = 12$
$2.7 \times 100 \times .1^{3/2} = 9$
$2.7 \times 50 \times .15^{3/2} = 8$
$2.7 \times 40 \times .1^{3/2} = 3$
$2.7 \times 17 \times .15^{3/2} = 3$ $\Sigma = 57$ CFS

ELEV. 523.2

$2.7 \times 50 \times .5^{3/2} = 48$
$2.7 \times 50 \times .4^{3/2} = 34$
$2.7 \times 100 \times .3^{3/2} = 44$
$2.7 \times 50 \times .35^{3/2} = 28$
$2.7 \times 50 \times .1^{3/2} = 4$
$2.7 \times 81 \times .2^{3/2} = 20$
$2.7 \times 28 \times .25^{3/2} = 9$ $\Sigma = 187$ CFS

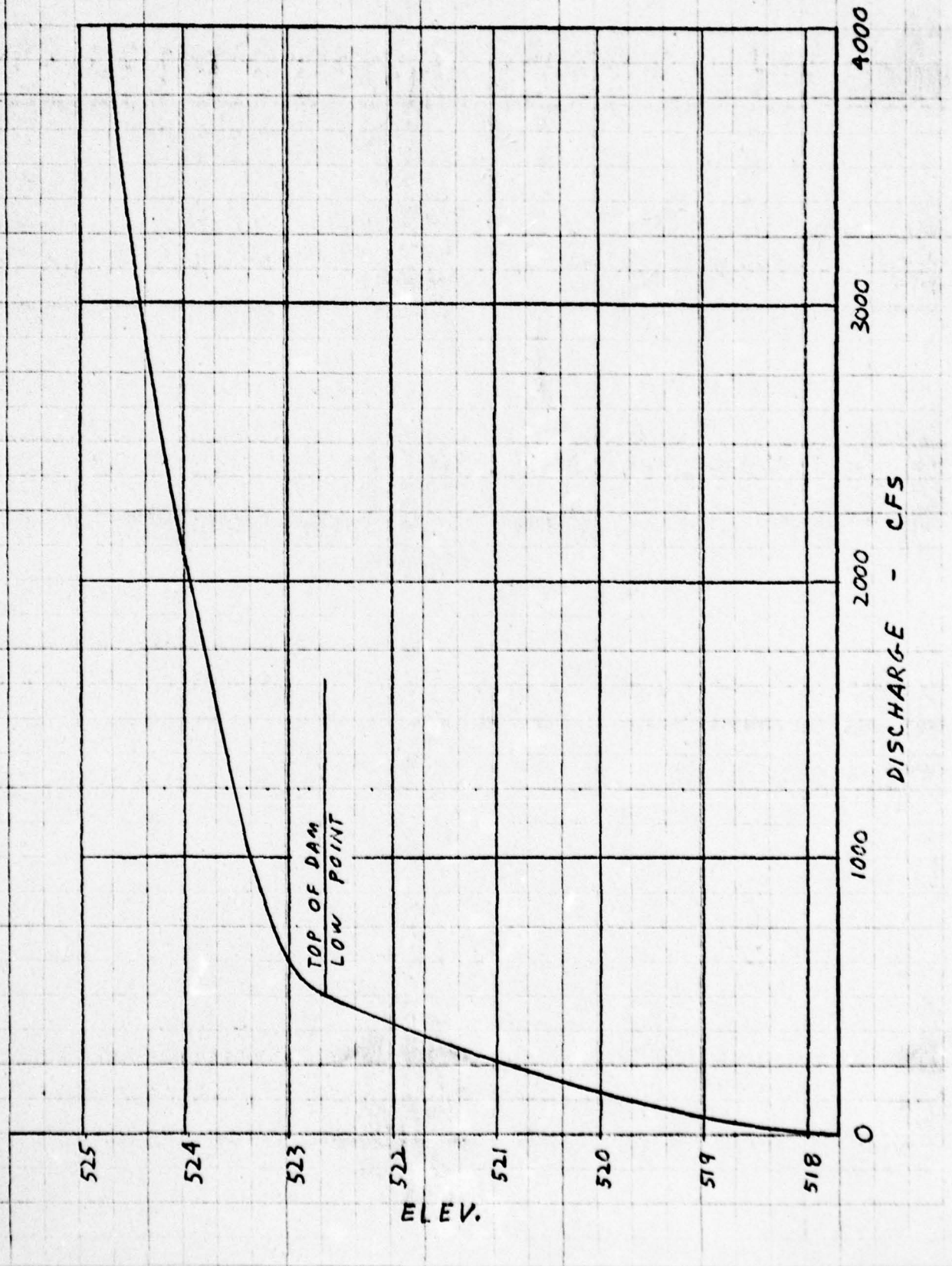
ELEV. 523.6

$2.7 \times 50 \times .9^{3/2} = 115$
$2.7 \times 50 \times .8^{3/2} = 97$
$2.7 \times 100 \times .7^{3/2} = 158$
$2.7 \times 50 \times .75^{3/2} = 88$
$2.7 \times 50 \times .5^{3/2} = 48$
$2.7 \times 50 \times .4^{3/2} = 34$
$2.7 \times 81 \times .6^{3/2} = 102$
$2.7 \times 50 \times .45^{3/2} = 41$
$2.7 \times 25 \times .1^{3/2} = 2$ $\Sigma = 685$ CFS

ELEV. 524.2 $\Sigma = 1847$ CFS
ELEV. 524.7 $\Sigma = 3082$ CFS

BY RLS DATE 9/18/79 | BERGER ASSOCIATES | SHEET NO. 4 OF
CHKD. BY DATE | PROJECT D8490
SUBJECT STRACK'S DAM

DISCHARGE RATING CURVE



BY RLS DATE 9/16/29 | BERGER ASSOCIATES | SHEET NO. 5 OF
CHKD. BY DATE | PROJECT 8490
SUBJECT STRACK'S DAM

SIZE CLASSIFICATION

MAXIMUM STORAGE = 479 ACRE-FEET
MAXIMUM HEIGHT = 25 FEET
SIZE CLASSIFICATION IS "SMALL"

HAZARD CLASSIFICATION

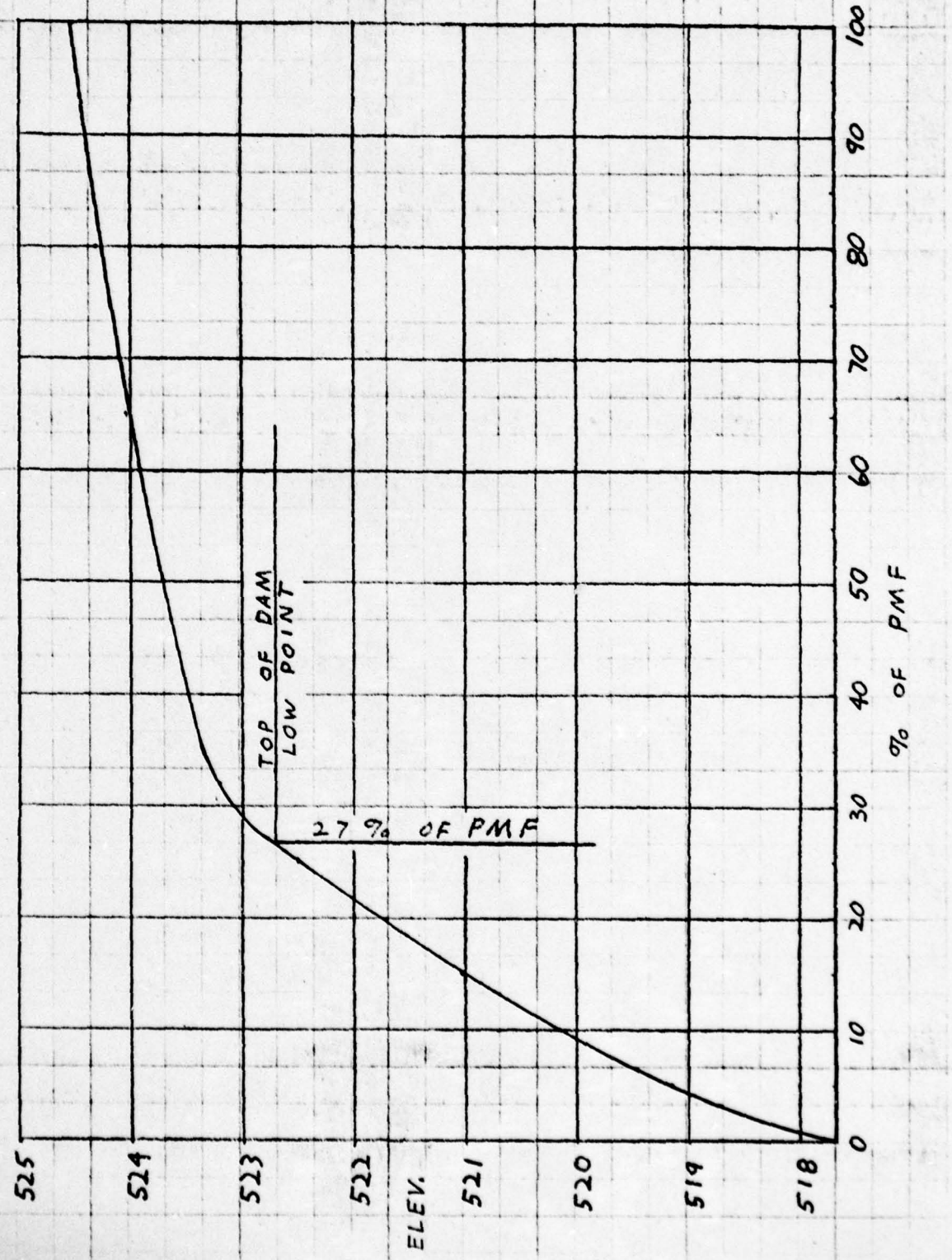
FARMS NEAR DOWNSTREAM CHANNEL TO ROUTE 422 CROSSING 6600 FEET DOWNSTREAM.
USE "SIGNIFICANT"

RECOMMENDED SPILLWAY DESIGN FLOOD

THE ABOVE CLASSIFICATIONS INDICATE USE OF AN SDF EQUAL TO THE 100-YR FLOOD TO ONE-HALF PMF.

BY RLS DATE 4/19/79 | BERGER ASSOCIATES | SHEET NO. 7 OF
CHKD. BY DATE | PROJECT D8490
SUBJECT STRACK'S DAM

SPILLWAY CAPACITY CURVE



BY RLS DATE 4/16/29 | BERGER ASSOCIATES | SHEET NO. 6 OF
CHKD. BY DATE | PROJECT D8490
SUBJECT STRACK'S DAM

HEC-1 DATA

DRAINAGE AREA = 1.5 SQ. MI.

DELAWARE BASIN REGION 6
CP = 0.40
CT = 1.35
LONGEST WATER COURSE = 2.03 MI.
LENGTH TO CENTROID = 0.64 MI.

$T_P = C_T (L \times L_{CA})^{.3}$
$T_P = 1.46$

RAINFALL (HMR-33)
INDEX = 23.2"

ZONE 6
INCREMENTAL RAINFALL
6 HR. = 113%
12 HR. = 123%
24 HR. = 132%
48 HR. = 143%

PLANIMETERED AREAS (FROM QUAD SHEET)
ELEV: 517.7 = 29.75 ACRES
520 = 44.44 ACRES
540 = 138.66 ACRES

ZERO STORAGE ELEV.
ELEV. = 517.7 - (STORAGE x 3/AREA)
= 491.3

```
1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION  JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************
    1     A1    STRACK'S DAM  ####  UNNAMED TRIBUTARY OF TULPEHOCKEN CREEK
    2     A2    JACKSON TWP., LEBANON COUNTY, PA.
    3     A3    ND1 #  PA-00596    PA DER #  38-20
    4     B   300     0    15     0     0     0     0     0    -4     0
    5     B1    5
    6     J     1     9     1
    7     J1    1    .8    .65    .5    .35   .25   .15   .1    .05
    8     K           1                                 1
    9     K1                INFLOW  HYDROGRAPH
   10     N     1     1    1.5                                      1
   11     P          23.2   113   123   132   143
   12     T                                                 1    .05
   13     W  1.46    .4
   14     X  -1.5   -.05    2
   15     K     1     2                                     1
   16     K1              RESERVOIR  ROUTING
   17     Y                          1
   18     Y1    1                                      262.2    -1
   19     Y4 517.7  518.2  518.7  519.2  519.7  520.7  521.7  522.7  522.8  522.9
   20     Y4   523  523.2  523.4  523.6  523.7  524.2  524.7
   21     Y5     0     15     43     79    122    224    351    510    531    565
   22     Y5   620    787   1021   1383   1548   2427   3991
   23     $A     0  29.75  44.44 138.66
   24     $E 491.3  517.7    520    540
   25     $$ 517.7
   26     $D 522.7
   27     K    99
1                PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                      RUNOFF HYDROGRAPH AT          1
                      ROUTE HYDROGRAPH TO           2
                      END OF NETWORK

1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION  JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

 RUN  DATE# 79/04/19.
      TIME# 07.17.02.

                      STRACK'S DAM  ####  UNNAMED TRIBUTARY OF TULPEHOCKEN CREEK
                      JACKSON TWP., LEBANON COUNTY, PA.
                      ND1 #  PA-00596    PA DER #  38-20

                                JOB SPECIFICATION
                 NO    NWA   NMIN   IDAY   IHR   IMIN   METRC   IPLT   IPRT   NSTAN
                300     0     15     0     0     0      0      0     -4      0
                             JOPER    NWT   LROPT   TRACE
                               5       0     0       0
```

STRACK'S DAM #### UNNAMED TRIBUTARY OF TULPEHOCKEN CREEK
JACKSON TWP., LEBANON COUNTY, PA.
ND1 # PA-00596 PA DER # 38-20

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	-4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= 1.00 .80 .65 .50 .35 .25 .15 .10 .05

########## ########## ########## ########## ##########

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.50	0.00	1.50	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.20	113.00	123.00	132.00	143.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.46 CP= .40 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 62 END-OF-PERIOD ORDINATES, LAG= 1.47 HOURS, CP= .40 VOL= 1.00

16.	61.	123.	189.	241.	265.	258.	235.	215.	196.
179.	164.	150.	137.	125.	114.	104.	95.	87.	79.
72.	66.	60.	55.	50.	46.	42.	38.	35.	32.
29.	27.	24.	22.	20.	19.	17.	16.	14.	13.
12.	11.	10.	9.	8.	8.	7.	6.	6.	5.
5.	4.	4.	4.	3.	3.	3.	3.	2.	2.
2.	2.								

0 END-OF-PERIOD FLOW

NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP
									SUM	26.54	24.13	2.41	939
										(674.)(613.)(61.)(2659.			

HYDROGRAPH ROUTING

RESERVOIR ROUTING

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	262.	-1

STAGE	517.70	518.20	518.70	519.20	519.70	520.70	521.70	522.70	522.80	522.90
	523.00	523.20	523.40	523.60	523.70	524.20	524.70			
FLOW	0.00	15.00	43.00	79.00	122.00	224.00	351.00	510.00	531.00	585.00
	620.00	787.00	1021.00	1363.00	1548.00	2427.00	3991.00			
SURFACE AREA=	0.	30.	44.	139.						
CAPACITY=	0.	262.	347.	2091.						
ELEVATION=	491.	518.	520.	540.						

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
517.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
522.7	0.0	0.0	0.

PEAK OUTFLOW IS 3430. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 2712. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 2141. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 1590. AT TIME 42.25 HOURS

PEAK OUTFLOW IS 931. AT TIME 43.00 HOURS

PEAK OUTFLOW IS 481. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 267. AT TIME 44.25 HOURS

PEAK OUTFLOW IS 169. AT TIME 44.50 HOURS

PEAK OUTFLOW IS 76. AT TIME 44.75 HOURS

APPENDIX D

GEOLOGIC REPORT

GEOLOGIC REPORT

Bedrock - Dam and Reservoir

Formation Name: Formerly called Martinsburg Formation, now included in "Hamburg Sequence".

Lithology: The dam is located in the gray shale facies of the Hamburg sequence. This is a medium gray to dark gray shale and silty shale, which weathers to a light tan or buff. The limestone facies of the Hamburg sequence consists of thin bedded, platy, dark gray limestone interbedded with black shale. Some beds of massive limestone, sandy dolomite, and intraformational conglomerate may also occur. Some of this limestone facies is present in the reservoir area.

Structure

The Hamburg sequence has had a long and complex structural history. The beds are tightly folded, and faulted; and cleavage often obscures the bedding. At the dam the trend of the bedding and cleavage is approximately E-W, dip is probably to the south. No faults have been mapped close to the dam, but exposures are few and detailed mapping has not been completed in the area.

Air Photo fracture traces trend N-S, N30°E, and N35°W.

Overburden

No core boring information is available for this dam, which was originally built in 1820. The overburden in this area consists of weathered shale, which is commonly 10 to 30 feet thick. Alluvium in the valleys of small creeks generally consists of silt and clay with minor sand and gravel.

Aquifer Characteristics

The Martinsburg shale is an essentially impermeable rock and ground water movement is along secondary fractures, joints and cleavage. The upper weathered zone is usually quite permeable, and in the unweathered shale major fracture zones can also be quite permeable.

Discussion

This is a very old dam, built originally for the Union Canal system. As far as is known none of these dams had any kind of cutoff trench or wall. The dam has a long history of leakage, much of which is probably moving through the weathered shale bedrock. Although limestone has been mapped in the reservoir area, it is not known to exist at the dam itself. There is, therefore, no reason to believe that the continued seepage through the bedrock has significantly altered the rock.

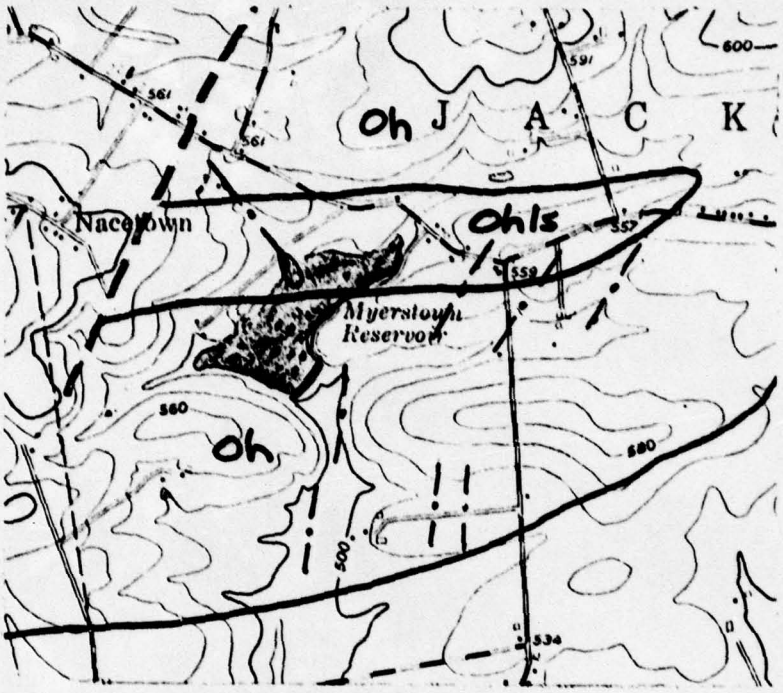
Sources of Information

1. Geologic Map of the Bethel Quadrangle (1977) in open file. Pa. Geological Survey, Harrisburg, Pa.

2. Air Photographs, 1:24,000, 1969.

3. Inspection reports in file.

GEOLOGIC MAP - Strack Dam



(geology from Pa. Geol. Survey- open file)

Oh	Hamburg Sequence - shale
Ohls	Hamburg Sequence - limestone
-·--·-	air photo fracture trace
— — —	fault

SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

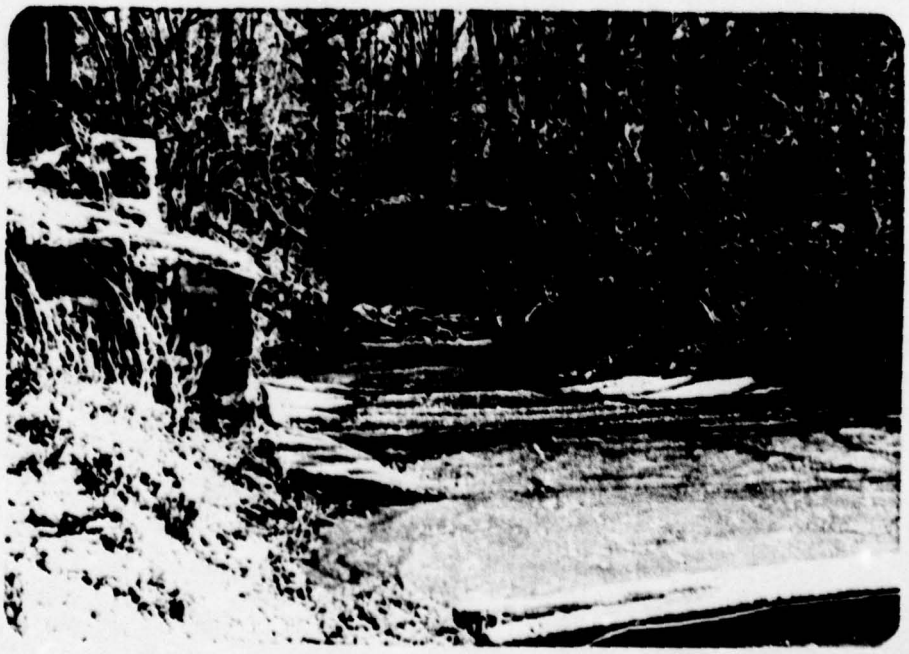
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET

APPENDIX E

PHOTOGRAPHS

Dam Crest and Downstream Slope



Spillway

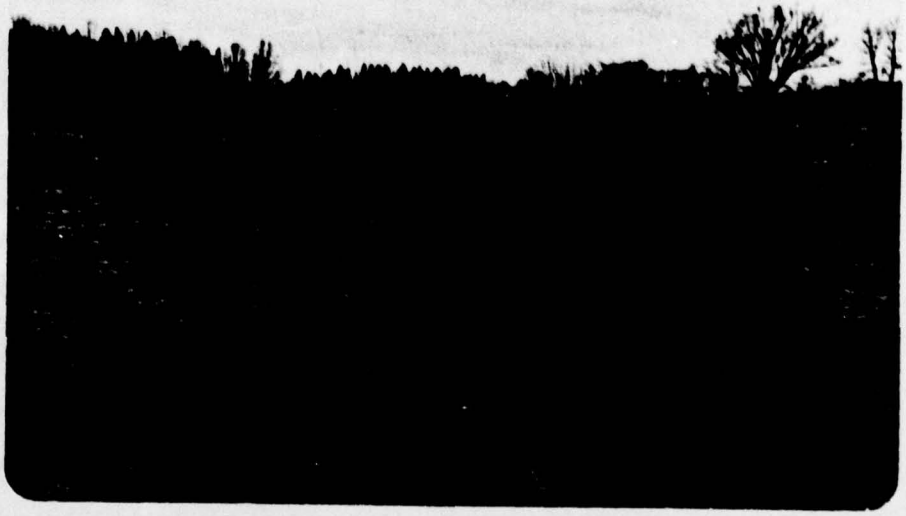
PA-00596
PLATE E-I

Right Abutment of Spillway

End of Spillway Chute

PA-00596
PLATE E-II

Old Pump House

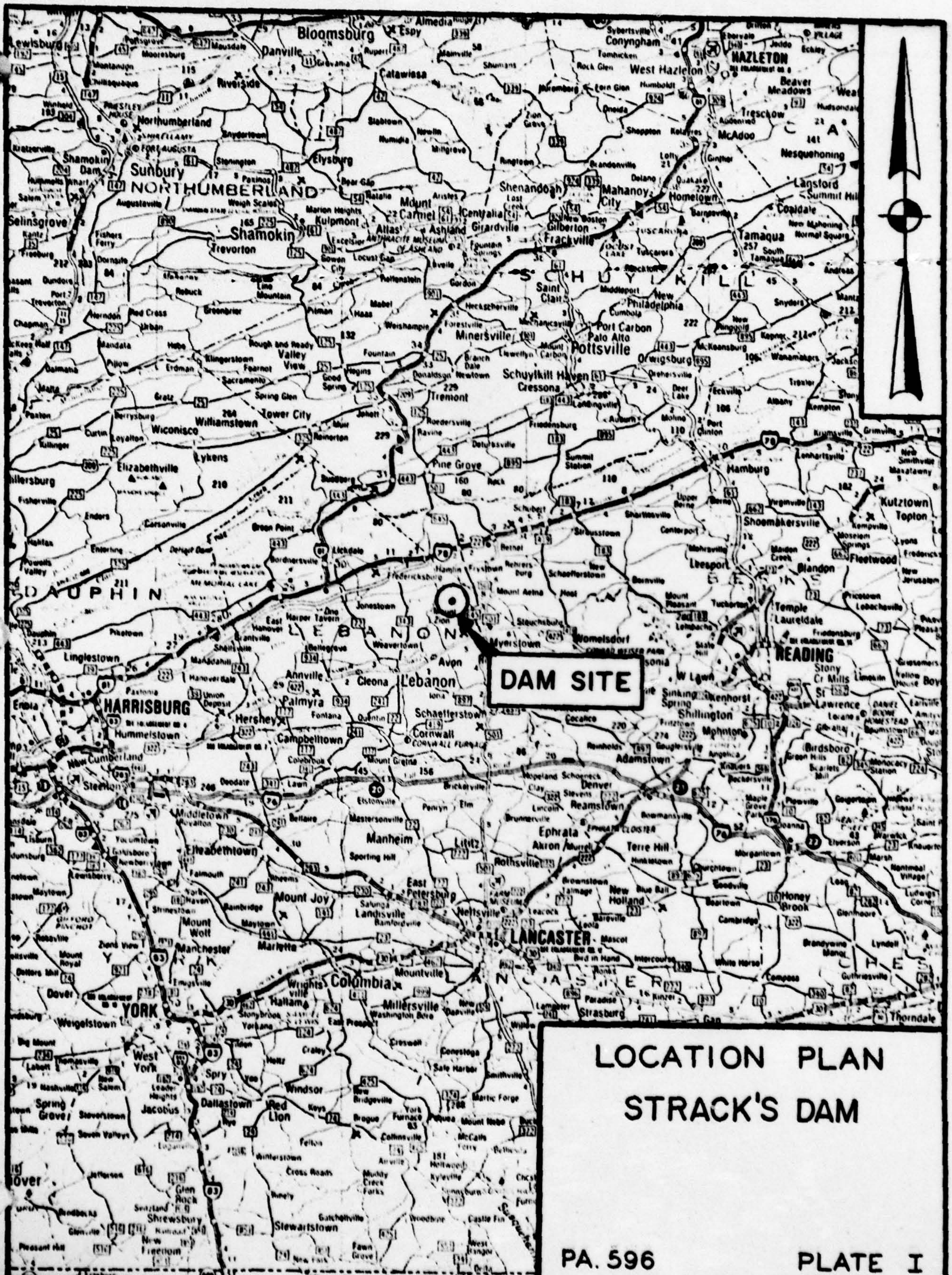


Reservoir

PA-00596
PLATE E-III

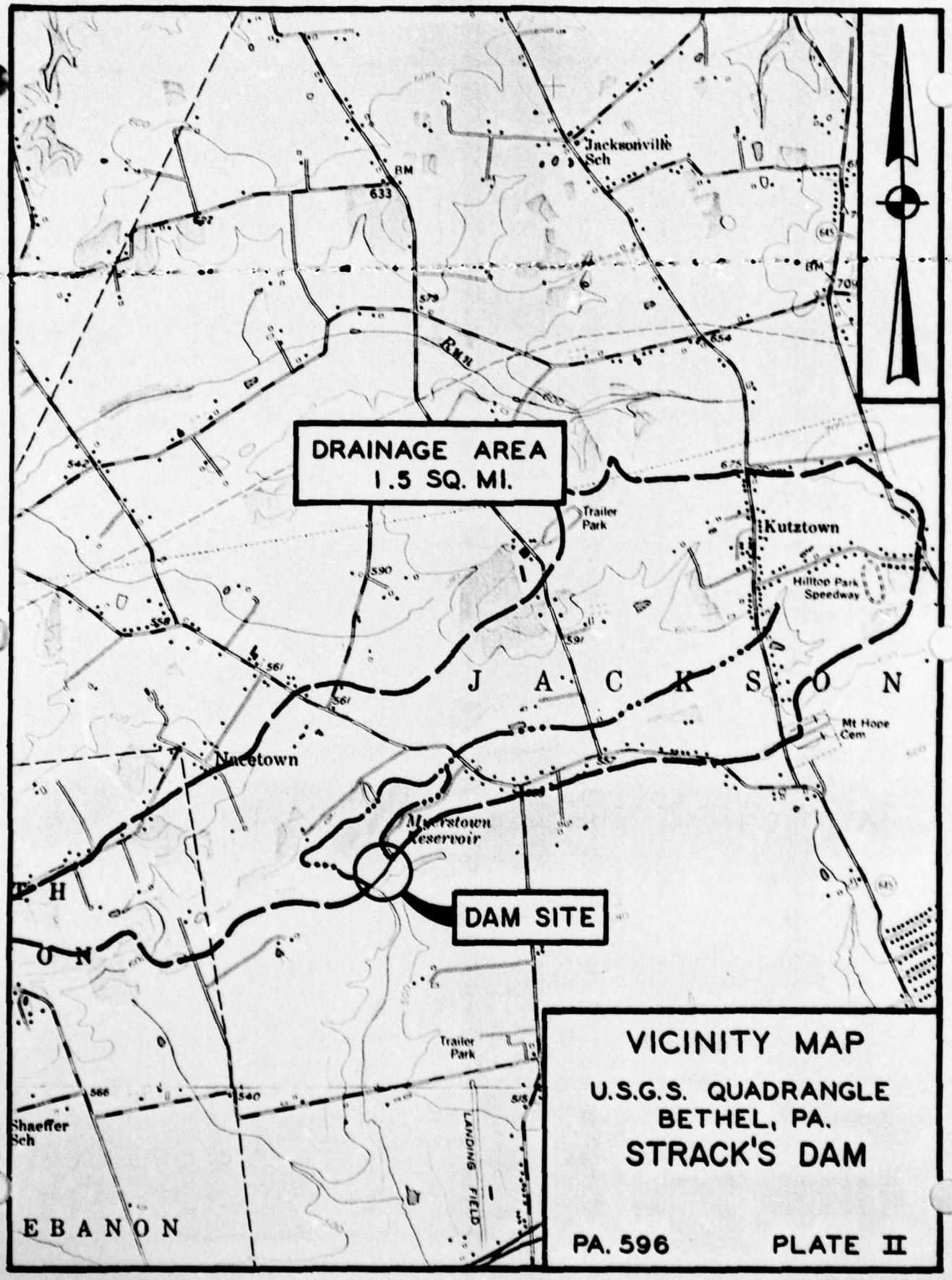
APPENDIX F

PLATES



LOCATION PLAN
STRACK'S DAM

PA. 596 PLATE I

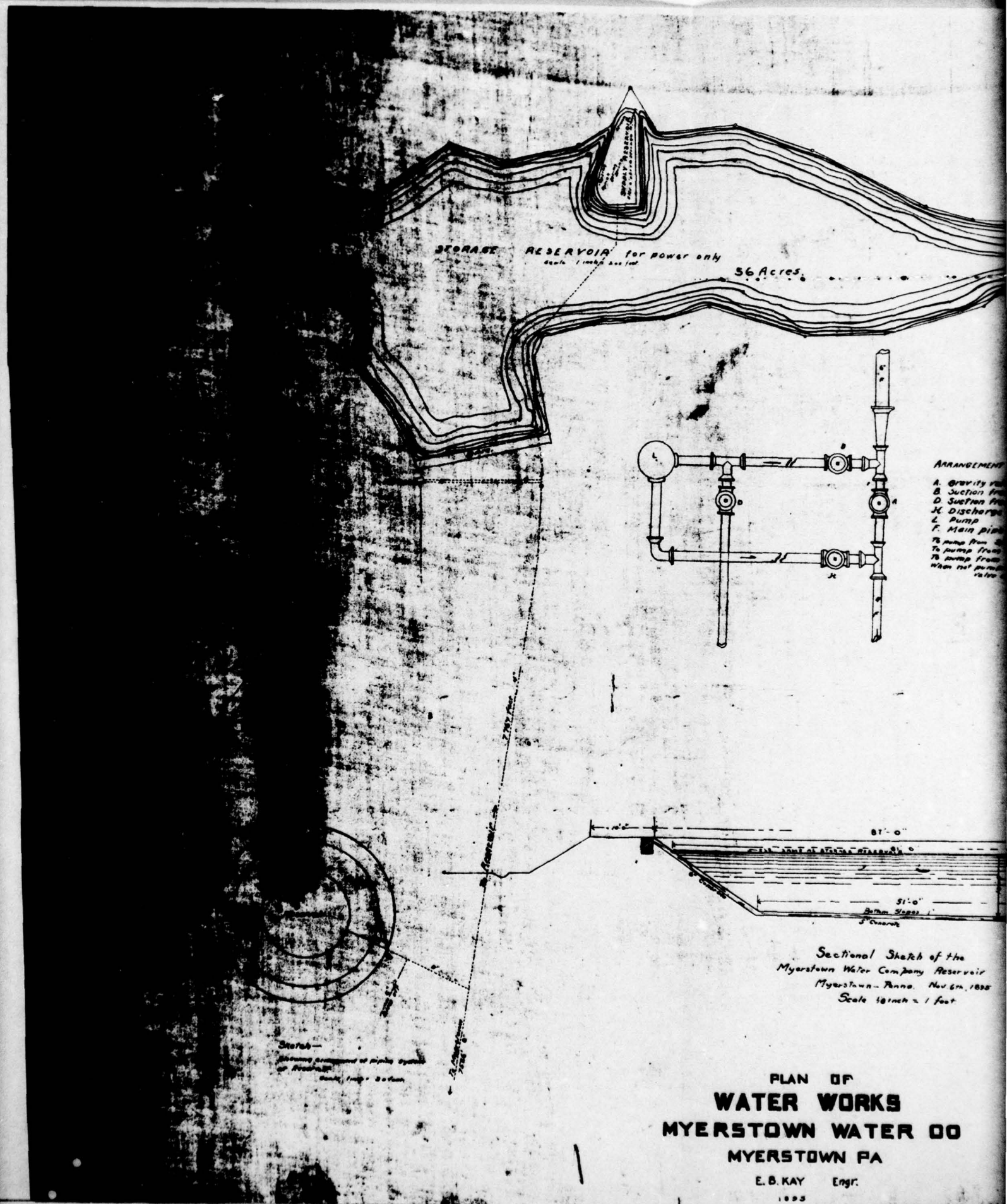


VICINITY MAP

U.S.G.S. QUADRANGLE
BETHEL, PA.

STRACK'S DAM

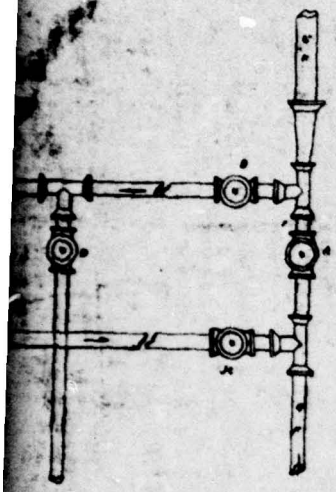
PA. 596 PLATE II



Sectional Sketch of the
Myerstown Water Company Reservoir
Myerstown - Penna. Nov 6th, 1895
Scale 10 inch = 1 foot

PLAN OF
WATER WORKS
MYERSTOWN WATER CO
MYERSTOWN PA

E. B. KAY Engr.
1895

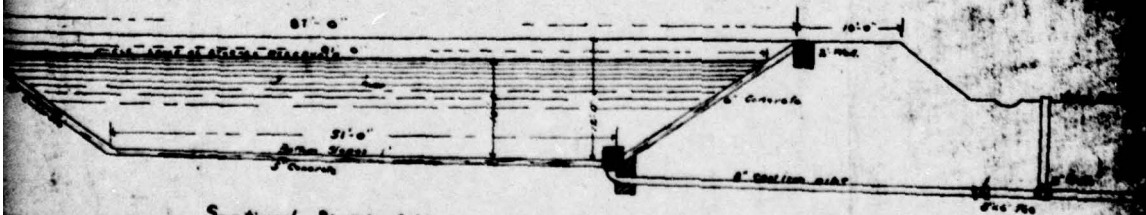


ARRANGEMENT OF VALVES AT PUMPING STATION MYERSTOWN.
WATER WORKS.

A. Gravity valve.
B. Suction from spring dam.
D. Suction from old dam.
K. Discharge valve.
L. Pump.
F. Main pipe from spring to reservoir.

To pump from Spring dam to reservoir. Open B+K and close A+D.
To pump from Old dam to reservoir. Open D+K and close A+B.
To pump from Big dam to Spring dam. Open A, D+K and close B.
When not pumping all valves will be closed except A allowing a gravity
valve and must be closed as soon as pump is stopped.

Scale ½ inch = 1 foot.



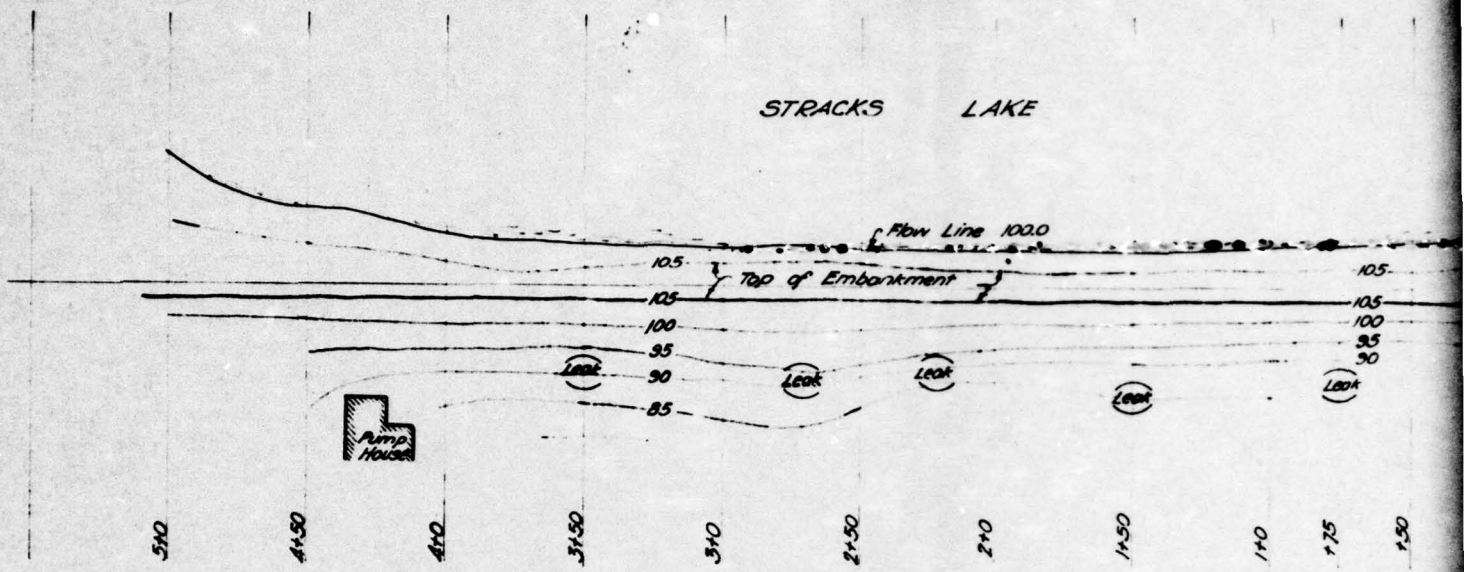
Sectional Sketch of the
Myerstown Water Company Reservoir
Myerstown - Penna. Nov 6th, 1895
Scale 10 inch = 1 foot

PLAN OF
WATER WORKS
ERSTOWN WATER CO
MYERSTOWN PA

E. B. KAY Engr.
1895

2

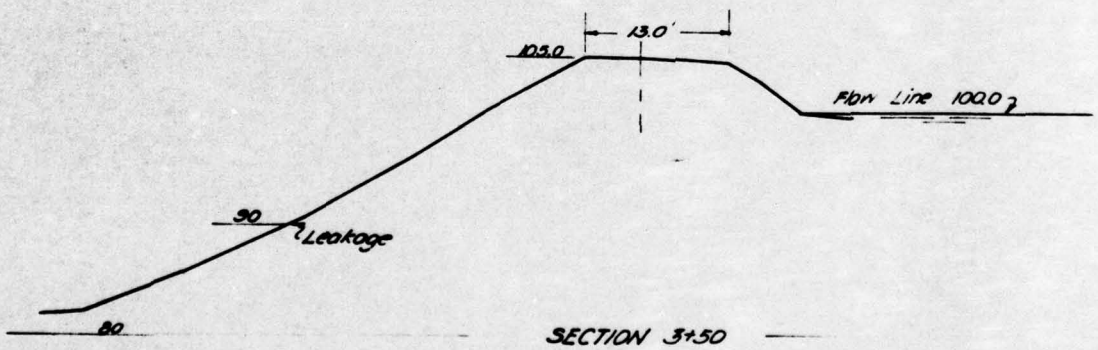
PA. 596
PLATE II



PLAN

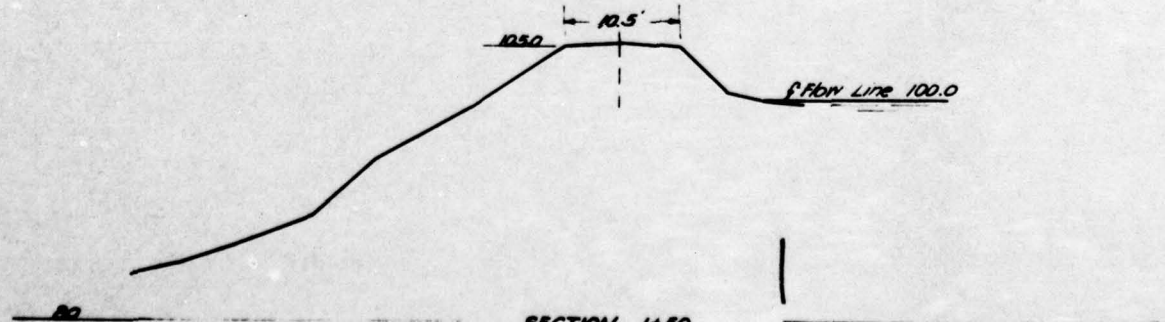
SHOWING EMBANKMENT CONTOURS

Scale: 1"=40'.



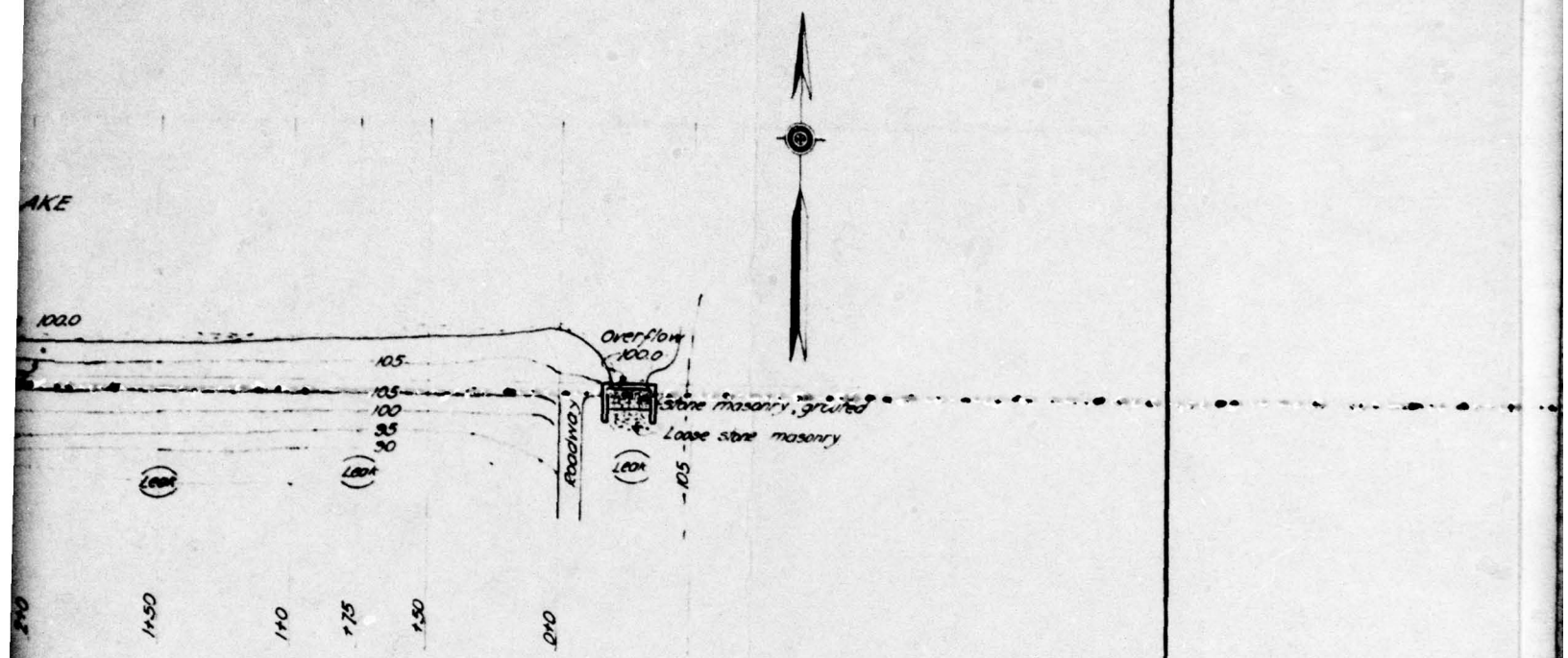
SECTION 3+50

Scale: 1"=10'.



SECTION 1+50

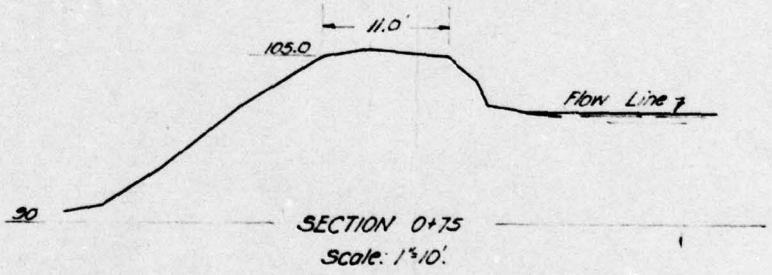
Scale: 1"=10'.



LAN

BANKMENT CONTOURS

e: 1"=40'.



SECTION 0+75

Scale: 1"=10'.

2

MYERSTOWN WATER COMPANY

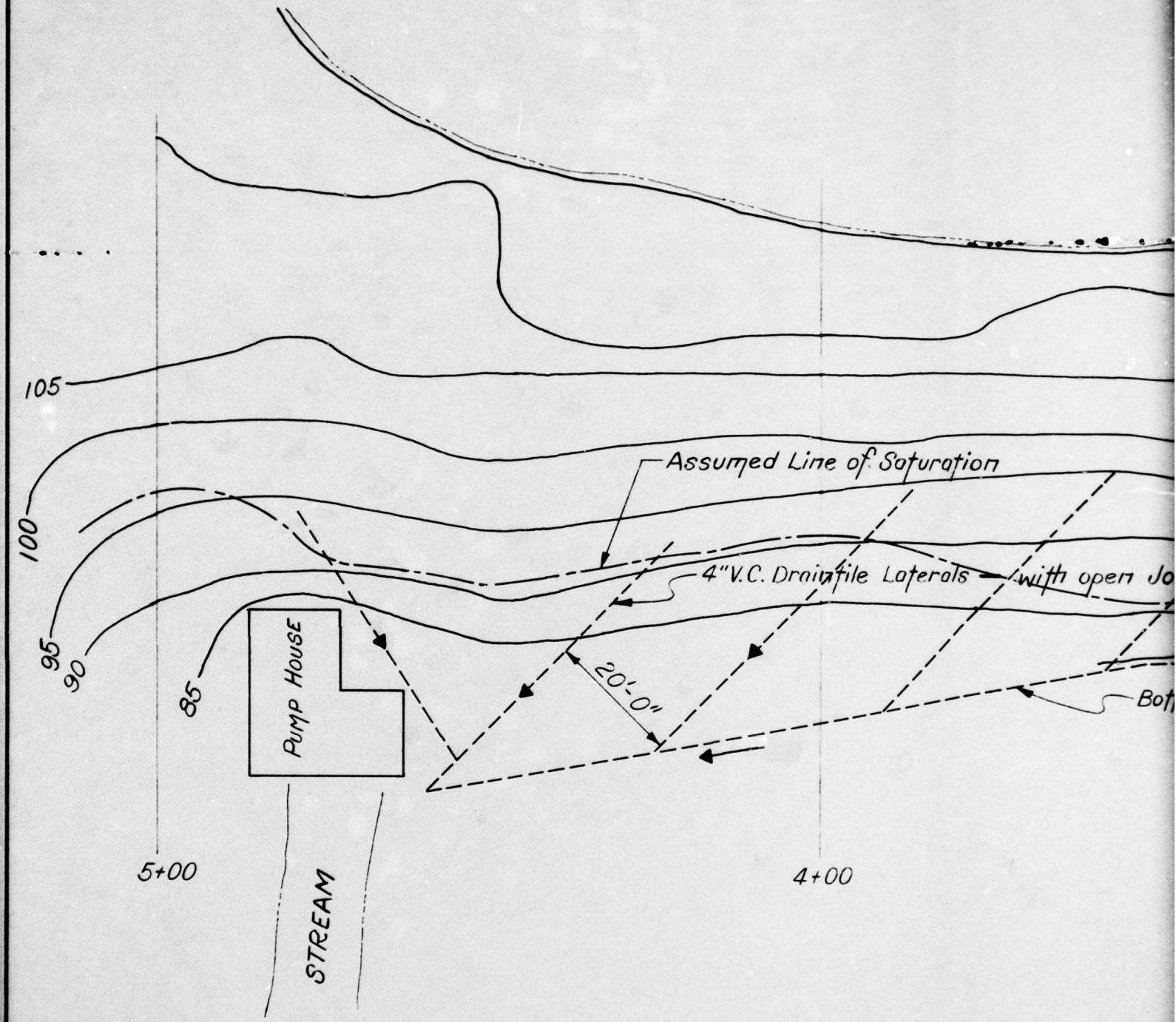
Myerstown, Pa.

PLAN OF STRACKS LAKE

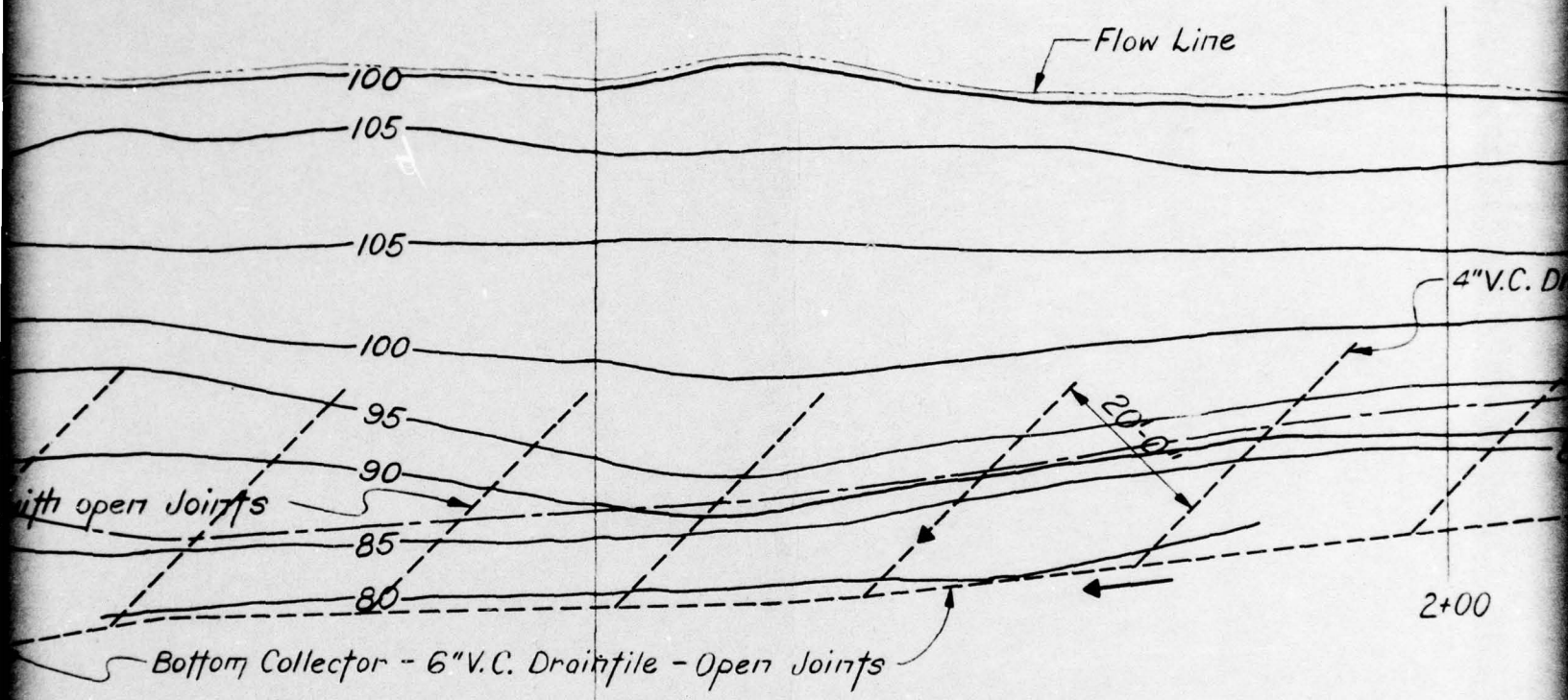
Lebanon County, Pa.

Scales: as ind. Oct., 1939.

PA. 596
PLATE IV


105
100
95
90
85
Assumed Line of Saturation
4" V.C. Drainfile Laterals
with open Jo
20'-0"
Bot
PUMP HOUSE
STREAM
5+00
4+00

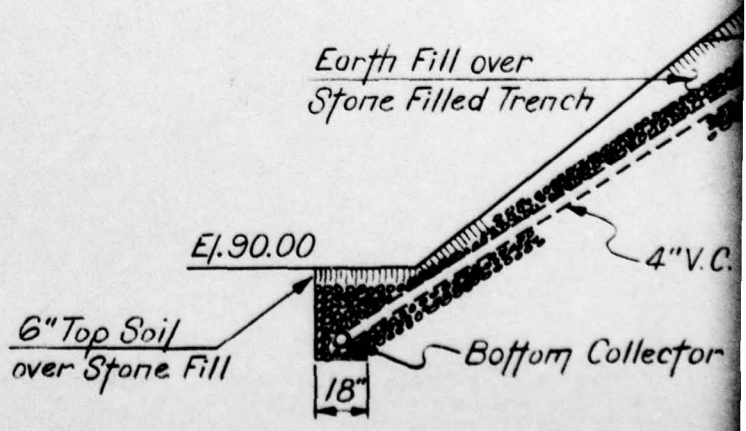
STRACK LAKE

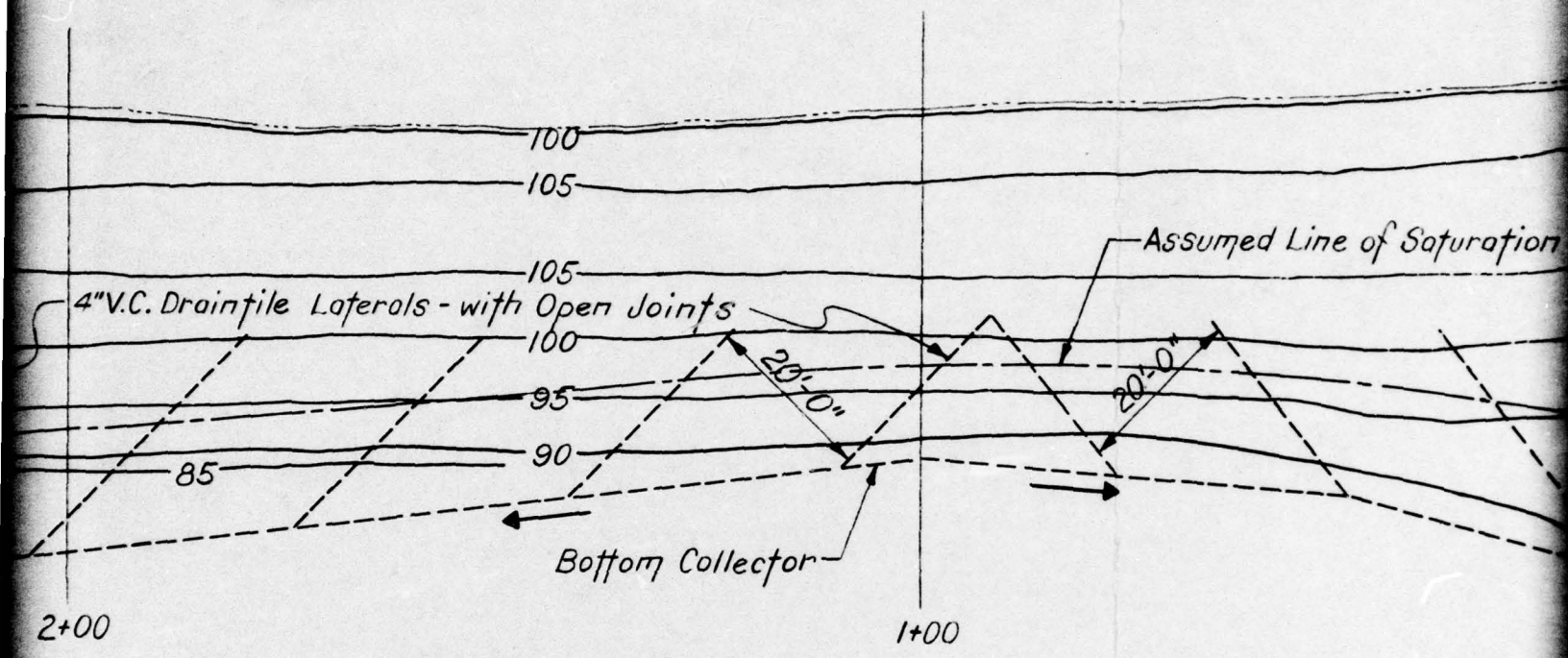


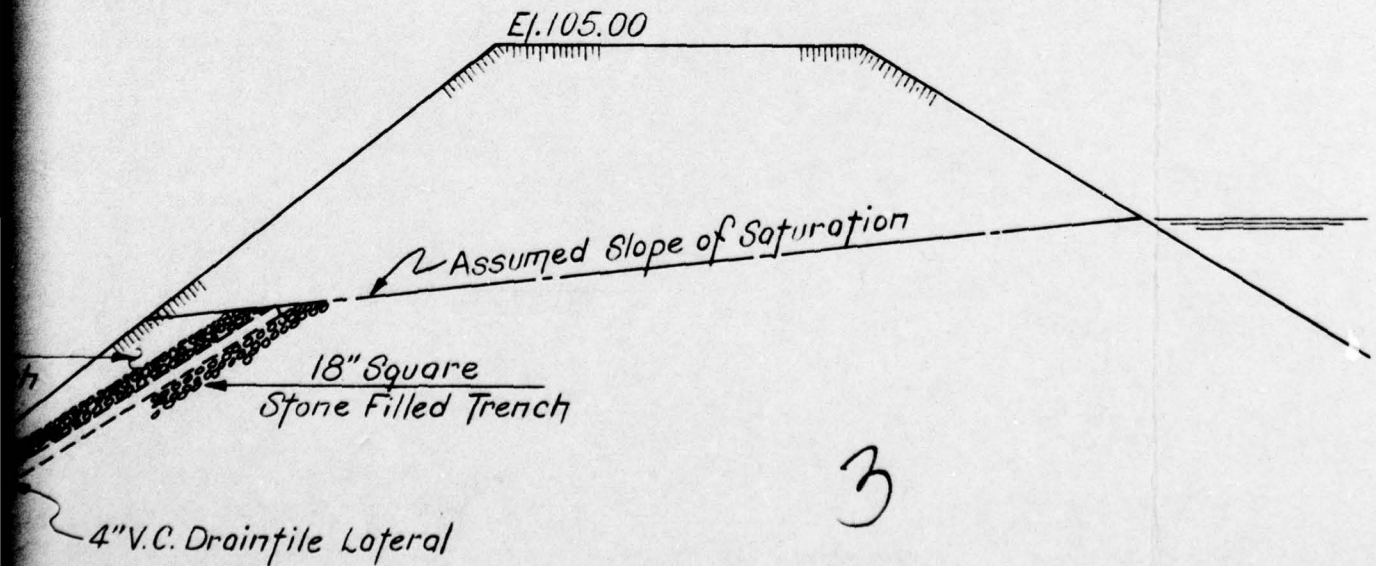
3+00

PLAN

Scale: 1" = 20'-0"



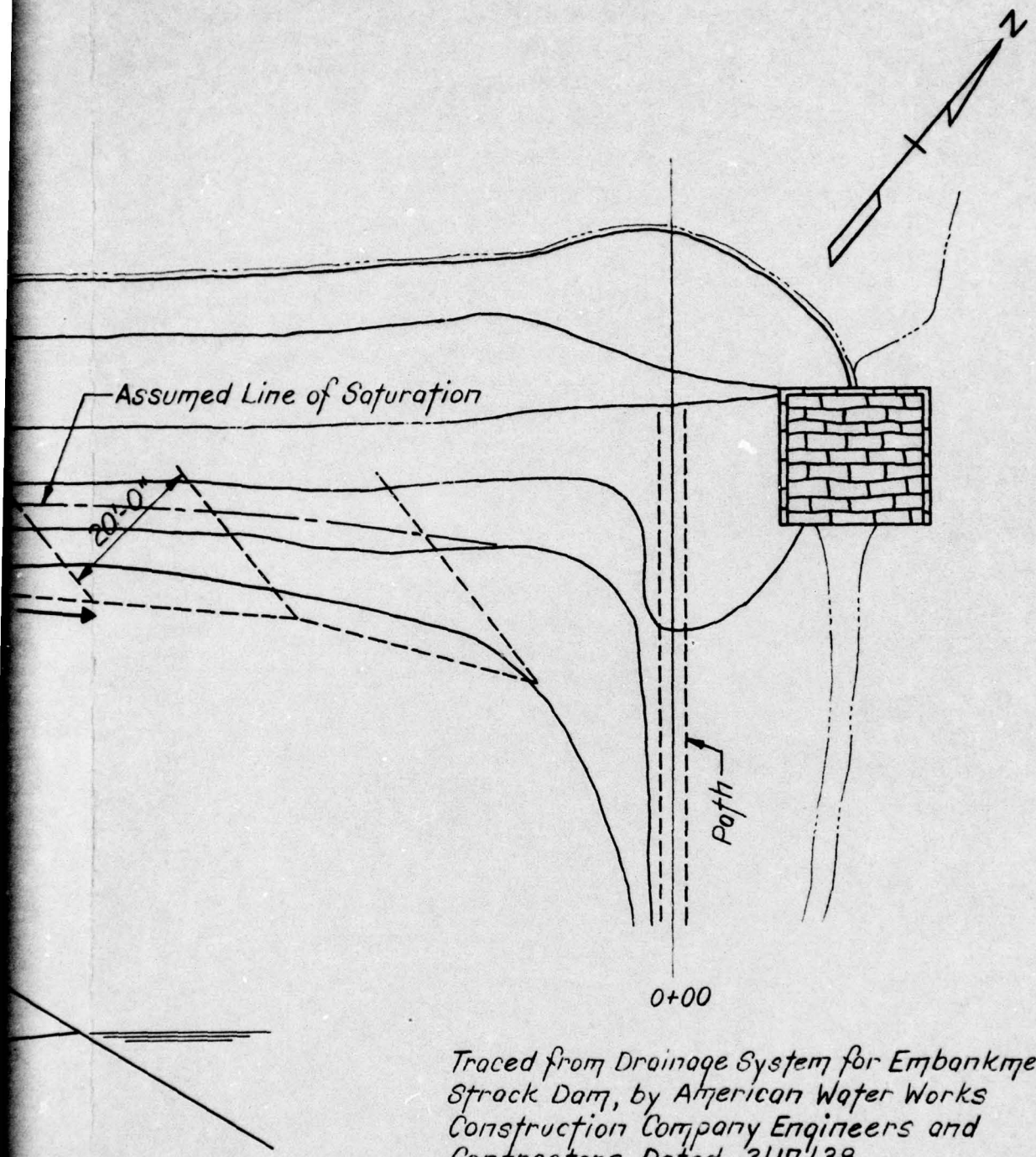




3

TYPICAL SECTION

Scale: 3/16" = 1'-0"



Traced from Drainage System for Embankment Strock Dam, by American Water Works Construction Company Engineers and Contractors Dated 3/17/38.

Traced by Berger Assoc. Inc. Date 2/21/79.

STRACK DAM
PA.596

4

PLATE V